United States Court of Appeals

for the Second Circuit

APPENDIX

75-6115

76-6022

IN THE UNITED STATES COURT OF APPEALS
FOR THE SECOND CIRCUIT

Docket Nos.
75-6115
76-6022

B

THE STATE OF NEW YORK,

Plaintiff-Appellant,

-against-

THE NUCLEAR REGULATORY COMMISSION, et al.,

Defendants-Appellees.

ON APPEAL FROM THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

JOINT APPENDIX
VOLUME III

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* Items marked by asteriks were sealed at the request of parties during the proceedings below by the District Court and are contained in Volume III of this Appendix which should be similarly treated as sealed.

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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

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THE STATE OF NEW YORK,

Plaintiff,

-against-

The Nuclear Regulatory Commission, and WILLIAM ANDERS as Chairman; the Energy Research and Development Administration and DR. ROBERT C. SEAMANS as the Administrator; the Department of Transportation, and WILLIAM T. COLEMAN as Secretary of Transportation; the Department of State and HENRY A. KISSINGER as Secretary of State; the Civil Aeronautics Board and ROBERT D. TIMM as the Chairman; the Federal Aviation Administration and ALEXANDER P. BUTTERFIELD as the Chairman; the United States Customs Service and VERNON B. ACREE as Commissioner and FRED R. BOYETT as Regional Commissioner,

Defendants.

75 Civ

SUPPLEMENTAL AFFIDAVIT IN SUPPORT OF THE MOTIONS FOR TEMPORARY RESTRAINING ORDER AND PRELIMINARY INJUNCTION

----------X

STATE OF NEW YORK)
: SS.:
COUNTY OF NEW YORK)

JOHN F. SHEA, III, being duly sworn, deposes and says:

1. I submit this affidavit in further support of plaintiff's motion for temporary restraining order and preliminary injunction. Due to the nature of the information contained herein, it is respectfully requested that the Court seal this affidavit.

2. During, approximately, the first week of April, 1975, Walter Martin, the Nuclear Regulatory Commission's Regional Inspection and Enforcement Officer for Region I, telephoned me at the office of the Attorney General of the State of New York. His stated purpose in calling was to inform me that a shipment of plutonium dioxide (PuO_2), already covered by a special nuclear

materials import license, was scheduled to come through John F. Kennedy International Airport on or about May 12, 1975, en route from Brussels, Belgium, to the Westinghouse Electric Company's atomic facilities in Cheswick, Pennsylvania. The licensed nuclear materials shipper was stated to me to be Transnuclear Corp., which maintains offices in Westchester, New York.

2. On April 30, 1975, I received a letter from Lee V. Gossick, Executive Director for Operations of the Nuclear Regulatory Commission, dated April 28, 1975, which stated, in part, that with respect to shipments by air of significant quantities of plutonium, scheduled to be imported or exported under existing licenses, "[t]here are no such licensee shipments of significant quantities of plutonium scheduled to come into or go out of J.F. Kennedy Airport." (See Exhibit "Q" to the Complaint).

3. After receiving Mr. Gossick's letter I called Walter Martin on the afternoon of April 30, 1975, to confirm the information he had previously given me concerning the shipment of plutonium by Transnuclear Corp. scheduled for May 12, 1975. Mr. Martin stated that shipment was still to come through John F. Kennedy International Airport as and when originally planned. Mr. Martin said he had just recently spoken with Ike Dornfeld, Airports Manager for the Port Authority of New York and New Jersey. He stated that Mr. Dornfeld had requested of Transnuclear Corp. that it use an airport other than J.F.K. for the May 12, 1975 shipment, but was refused such request by Transnuclear Corp. officials.

4. A letter, dated April 14, 1975, from Daniel J. Donoghue, Director of the Office of Administration of the Nuclear Regulatory Commission to Lorna Salzman, Local Issues Chairwoman of the Friends of the Earth, was presented to me on April 30,

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1975, by Ms. Salzman. That letter, a copy of which is attached hereto as Exhibit "A", states that a "shipment of about 45 kilograms [of plutonium] is scheduled for some time in May." The letter states that the shipment is part of the "plutonium oxide importation by Westinghouse and Transnuclear Corps."

5. It is respectfully submitted that this specific flight of plutonium oxide consisting of approximately 45 kilograms will be flown into and be transported through New York City unless this Court grants the temporary injunctive relief requested herein.

WHEREFORE, it is respectfully requested that this Court grant plaintiff's motions for a temporary restraining order and a preliminary injunction.

JOHN F. SHEA, III

Sworn to before me this
2nd day of May, 1975

Assistant Attorney General
of the State of New York

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

APR 14 1975

Ms. Lorna Salzman
Local Issues Chairwoman
Friends of the Earth
72 Jane Street
New York, New York 10014

Dear Ms. Salzman:

This is in response to your letter of March 26, 1975, which was received by this office on March 31, 1975, in which you requested, pursuant to the Freedom of Information Act, the complete documentation relating to the plutonium oxide importation by Westinghouse and Transnuclear Corps., the most recent of which was scheduled for arrival on February 24, 1975, via Seaboard World Airlines, including all documents relating to the packaging, handling, shipping and delivery of these shipments and future ones headed for the same destination.

We have identified six documents as falling within the scope of your request. Four of these documents which are listed in the Appendix can be made available and are enclosed. The two remaining documents, which are the physical security plans for Transnuclear, Inc. and Tri-State Motor Transit Company, are being withheld. In addition, the Inspection Report, which is one of the documents being made available, has minor deletions pertaining to the safeguarding of special nuclear material.

Information received from the licensee indicates that there is one more planned shipment of about 45 kilograms scheduled for some time in May. At this time, the port of entry is unknown.

Pursuant to 10 CFR 9.9(b) of the Commission's regulations, I have determined that the safeguards information withheld is privileged commercial information within the meaning of the Freedom of Information Act and is exempt from production or disclosure and that its production or disclosure is contrary to the public interest. This denial is based upon exemption (4) of the Freedom of Information Act (5 U.S.C. 552(b)(4)) and 10 CFR 9.5(a)(4) of the Commission's regulations. The persons responsible for this denial are the undersigned, Mr. Howard J. Larson, Acting Director, Office of Nuclear Material Safety and Safeguards, and Dr. Donald F. Knuth, Director, Office of Inspection and Enforcement.

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This denial may be appealed within 30 days from the receipt thereof to the Commission's Executive Director for Operations. As provided by 10 CFR 9.11, any such appeal must be in writing, addressed to the Executive Director for Operations, U.S. Nuclear Regulatory Commission, Washington, D. C. 20555, and must clearly state on the envelope and in the letter that it is an "Appeal from an Initial FOIA Decision." A copy of 10 CFR Part 9 is enclosed for your use.

Sincerely,

Daniel J. Donoghue, Director
Office of Administration

Enclosures:
As stated

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

----------X

THE STATE OF NEW YORK,

Plaintiff,

-against-

75 Civ 2121 (WCC)

The Nuclear Regulatory Commission, and WILLIAM ANDERS as Chairman; the Energy Research and Development Administration and DR. ROBERT C. SEAMANS as the Administrator; the Department of Transportation, and WILLIAM T. COLEMAN as Secretary of Transportation; the Department of State and HENRY A. KISSINGER as Secretary of State; the Civil Aeronautics Board and ROBERT D. TIMM as the Chairman; the Federal Aviation Administration and ALEXANDER P. BUTTERFIELD as the Chairman; the United States Customs Service and VERNON B. ACREE as Commissioner and FRED R. BOYETT as Regional Commissioner,

AFFIDAVIT

Defendants.

----------X

STATE OF NEW YORK)
: SS.:
COUNTY OF NEW YORK)

PETER N. SKINNER, being duly sworn deposes and says:

I make this affidavit in further support of the plaintiff's motion for a temporary restraining order and preliminary injunction. This affidavit includes three sections. I. A step by step description on how to make a nuclear bomb using plutonium. II. A breakdown of those 124 persons who knew the specific details of a plutonium shipment. III. A description of how plutonium may be used as a destructive aerosol by terrorists.

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I. NUCLEAR WEAPONS CONSTRUCTION

The basic steps taken in making a nuclear bomb using plutonium are as follows:

1. Convert 6-8 kgs. of PuO_2 to plutonium metal by the following reaction.

   Plutonium Oxide and Lanthanum +> 1,000 C→

   Plutonium Metal and Lanthanum Oxide.

2. Form two hemispheres of plutonium with a combined mass just under the critical mass. This can be done with an electric furnace, a ceramic crucible, and a glove box. The two halves together form a sphere about the size of a grapefruit.

3. A neutron reflector now has to be built. Good materials for this are natural uranium, steel, copper, magnesium, lead, aluminum, berylium, water, solder, or wax. Two stainless steel mixing bowls could be lined with a three inch thickness of wax and soldered together around the plutonium. An even better reflector could be a pressure vessel of the sort that is used to lower instruments into the deep sea. It has steel walls two inches thick. All that has to be done is open it and put the plutonium inside.

4. The next step would be to cover the bomb with a uniform thickness of a plastic explosive such as C4 (TNT plus a plasticizer).

5. The final step is to attach either a home-made or commercially bought detonator.

During the whole operation a geiger-counter is kept near the bomb. As the reflector and explosives are put on the plutonium, fewer neutrons escape, and the plutonium comes close to criticality. If it gets too close, as indicated by the geiger-counter, the mechanism must be disassembled and after recalculations reassembled.

II. WHO KNEW THE DETAILS OF A PLUTONIUM SHIPMENT?

There were 124 people in eleven public and private agencies that knew the details of a specific plutonium shipment. The following is an agency by agency breakdown of this figure. See Appendix 1 for a graphic description.

(1)--Westinghouse Atomic division in Cheswick, Pennsylvania, the fuel rod fabricator and the final destination of this shipment, had only two people who were informed of the exact details of the shipping information. They knew anywhere from two months to eight days prior to the shipment's arrival.

(2)--The shipper, Transnuclear Corporation, had the information as soon as details of the shipment were formulated, again from two months to eight days prior to the shipment. A total of seven people had this information, including four management personnel and three additional employees.

(3)--The airline, Seaboard World Airlines, had a total of thirteen employees who knew about the shipment in advance. Six airline personnel, including the coordinator two at the busing station, and one each in three foreign countries (over which the flight went), knew eight days in advance. Seven additional people, including three pilots and four security guards were informed the day of the flight. We should emphasize that these particular figures are very conservative, that probably fifteen to twenty employees knew the details of the shipment in advance.

(4)--The Port of New York Authority had [illegible] persons aware 24 hours in advance of the shipment. This includes 2 crew chiefs, 10 fire fighters, 2 escorts, and 4 other employees.

(5)--The custom house broker, Marquis Transport Co., informed us that three people had the shipping details two days prior to the shipment.

(6)--The United States Customs Service was informed of the shipment one day in advance. Eight peop are notified, including three office workers, three in the entry division, and two custom's inspectors.

(7)--Tri-State Motor Transit Company, the firm that transported the shipment from the airport to Pennsylvania, had ten knowledgeable people, including two dispatchers, four driver guards, two "night supporters", an executive vice president, and his assistant. They are notified one week in advance of the forthcoming shipment.

(8)--Lansdale Security, the firm hired to guard the shipment from the time of landing at the airport until the time of loading on the trucks, reported that two office workers knew three days in advance, and four or six armed guards knew the day of the shipment.

(9)--The New York City Health Department's Radiation Control Bureau was another agency in possession of the exact shipping details. These details were tacked on a bulletin board, open to the view of all thirty-two employees. Notification would usually occur two or three days prior to the shipment but sometimes as much as two weeks before.

(10)--The last group with access to these details was the New York City Police Department. A highly conservative figure would be that fifteen people had knowledge the same day of the shipment. However, it is possible that as many as seventy-five people had access to the shipping details, including field services and all the local precincts that the trucks carrying plutonium passed through.

(11)--Figures for Region I of the Nuclear Regulatory Commission were not obtained because all their personnel had been checked and cleared for security purposes. None of the employees of the other 10 agencies listed above were ever security checked.

	Weeks						Days													Total Man-days
	8	7	6	5	4	3	14	13	12	10	9	8	7	6	5	4	3	2	1	
Westinghouse	←	–	–	–	–	–	2	–	–	–	–	→	2	2	2	2	2	2	2	16 – 112
↳Trans Nuclear	←	–	–	–	–	–	7	–	–	–	→	7	7	7	7	7	7	7	7	56 – 392
↳Seaboard World Air.												6	6	6	6	6	6	6	13	55
↳Port of N.Y. Authority																			18	18
↳Marquis Transport																		3	3	6
↳U.S. Customs																			8	8
↳Tri-State Trucking													10	10	10	10	10	10	10	70
↳Lansdall Security																	2	2	6	10
↳NRC Region I	All pers and checked and cleared for security. Documents kept in safe.																			
↳Radiation Control of NY							←	–	–	–	–	–	–	–	–	–	–	→	32	32 – 448
↳NYC police																			15	15
																				286 – 1241

Total persons: 124

The number in each box refers to the number of people who know shipping information that day. A number in between two dotted arrows refers to the number of people who for certain shipments, know shipping information for up to the number of days that the arrow crosses.

APPENDIX 1.

III. AEROSOLS

In the event a terrorist obtained less than the amount of plutonium necessary to make a nuclear bomb, he would still have enough plutonium to make an aerosol weapon. Part of the contents of the "tuna fish" can would be sufficient to contaminate a large portion of say, the World Trade Center Tower. The terrorist would have to build a glove box in order to work with the material safely. This could be built with a few easily obtainable common tools and materials for about $20.00. In the glove box, the plutonium from the can would be funneled into a balloon and then the outside of the balloon decontaminated so it could be safely transported to the target.

The terrorist would then go to the World Trade Center and install this plutonium filled balloon in the air conditioner next to the fan. He would attach a slow burning fuse and then walk out of the building. The fuse would burn through the string and the balloon would fall into the fan, break apart, and release the plutonium into the rooms. Figure I shows that it would take 8.5 minutes for the plutonium to be dispersed through 5.44 million cubic feet of 16 floors. Figure II shows how long plutonium would stay in the circulating air. During a working day, the occupants of those floors would have inhaled enough plutonium to cause massive health deterioration or death within a short time. The calculations which support these conclusions follow the figures herein.

GENERAL CONSIDERATIONS

Plutonium oxide powder as an aerosol is a perfect weapon. A very small amount of the material can be lethal to many people in a semi-confined environment. It presents little risk to the bearer if he takes precautions against inhaling it or getting it in a cut or wound. Plutonium's radioactivity is not penetrating, therefore, it needs no shielding to be safely transported to a target. Since PuO_2 is generally a very fine powder (particles of 1 micron in diameter) it can be

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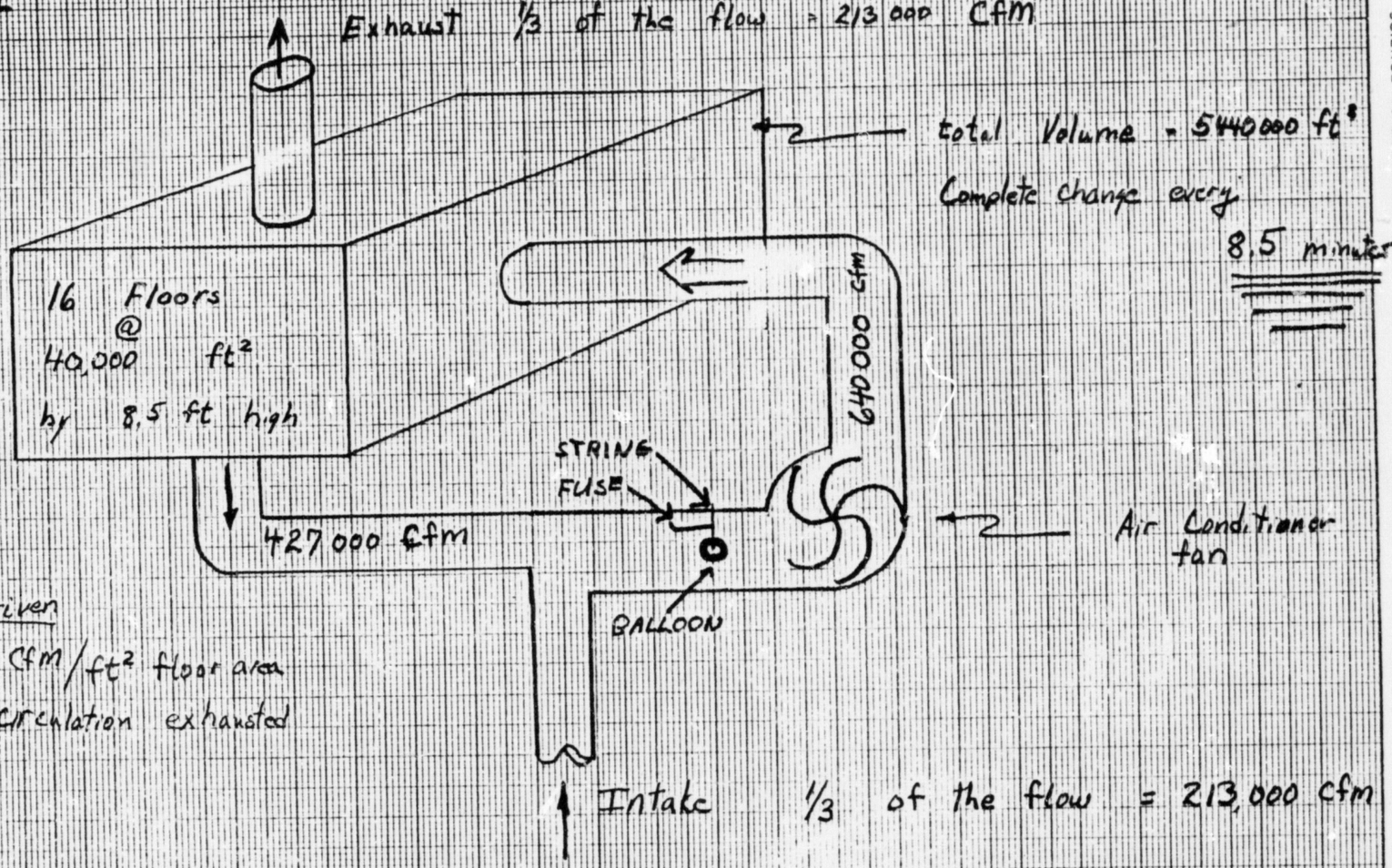
FIG. 1



Unit operation of World Trade Center Air Circulation System.

(Information supplied by Port of NY. NJ Auth.
Mr Robert Myer

SCIENCE · 10 SQUARES TO CENTIMETER

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FIG. 2

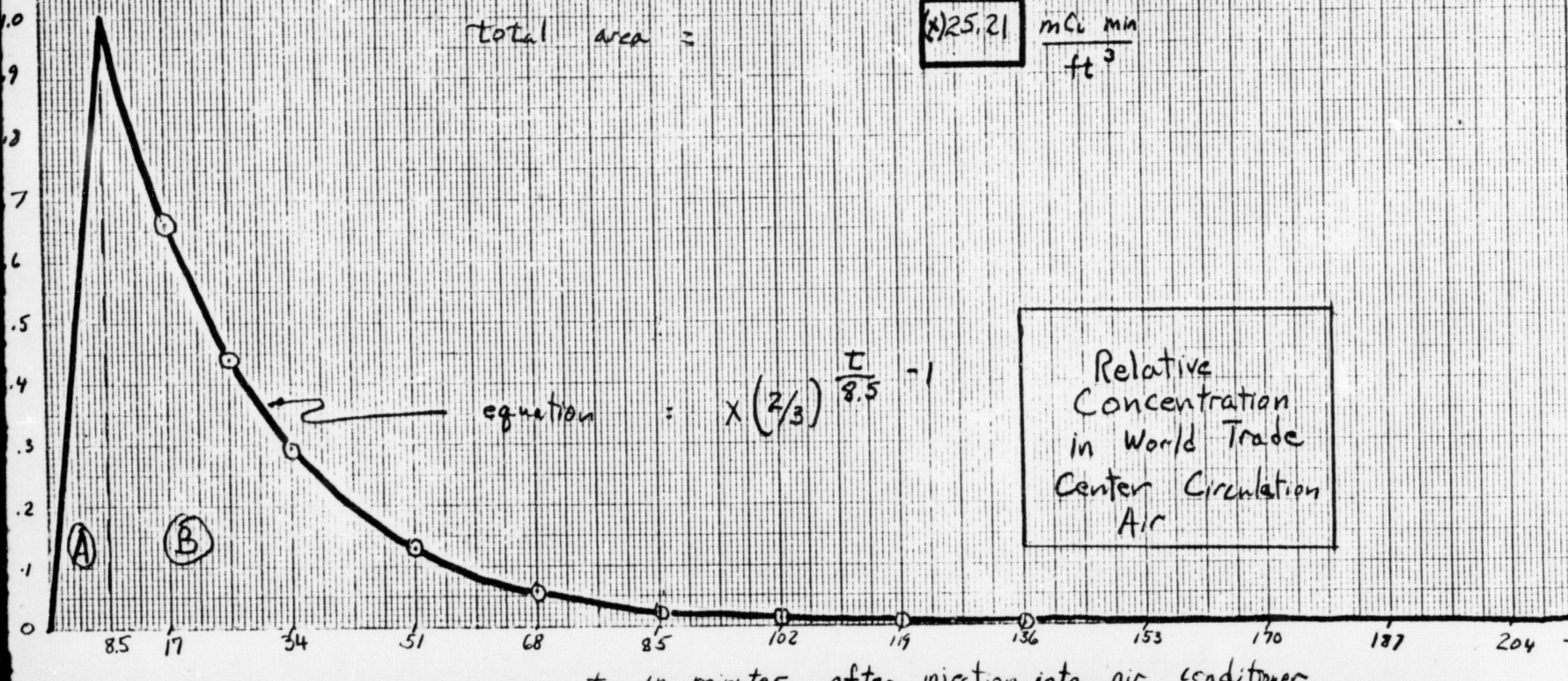
Area in part (A) = $\frac{(8.5)(1)}{2}$ = 4.25 $\frac{mCi\ min}{ft^3}$

Area in part (B) = $\int_{t=8.5}^{t=480} X\left(\frac{2}{3}\right)^{\frac{t}{8.5}-1}$

= 20.96 $\frac{mCi\ min}{ft^3}$

total area = (X) 25.21 $\frac{mCi\ min}{ft^3}$

t	exp.	Concentration
8.5	0	1.0
17	1	.667
34	3	.296
51	5	.132
68	7	.06
85	9	.026
102	11	.012
119	13	.005
136	15	.0023
480	55.6	2×10^{-10}



equation : $X\left(\frac{2}{3}\right)^{\frac{t}{8.5}-1}$

Relative Concentration in World Trade Center Circulation Air

dispersed very easily by small air currents. If it settles on surfaces in the room (that being of some question according to PLUTONIUM, Taube, 1964, p. 89) such air currents can resuspend it for inhalation. Once contaminated the area must be completely decontaminated if possible before subsequent entry by humans. It should be noted that dispersion in the World Trade Center represents but one of many possibilities for the imaginative terrorist. Other equally devastating uses are conceivable for plutonium in solid, gaseous, and liquid form. Calculations and mechanisms for these other forms would be similar to the scenario described herein.

BIOLOGICAL CONSIDERATIONS

Just as a terrorist would, we wondered how much plutonium would be required to kill an occupant of the World Trade Center. Classical scientific methods have been developed for the measurement of animal exposures whereby one can obtain a number denoted as the Median Lethal Dose or LD_{50}. This number relates the exposure to a pathogen to death within a specified period of time. Since no experiments have been carried out on humans, the literature on the subject does not provide a figure for LD_{50} for man.

However, in the past, certain experiments on animals have been utilized to predict the incidence of somatic (cell or tissue) effects in humans due to radiation exposure. According to the physicians I have contacted, this approach is most accurate at high dose levels. At these levels the cell and tissue response to damaging radiation are similar in humans and animals. Therefore, I have confidence that for the purpose of this analysis that acute dose rates capable of killing animals would also kill humans.

For actual numbers describing acute dose rates in animals, I contacted Dr. J.F. Park at Batelle Northwest Laboratory who has in the course of his experiments been exposing Beagle dogs to acute doses of inhaled PuO_2. Some of his data is reproduced below in Figure III from Wash 1320.

941

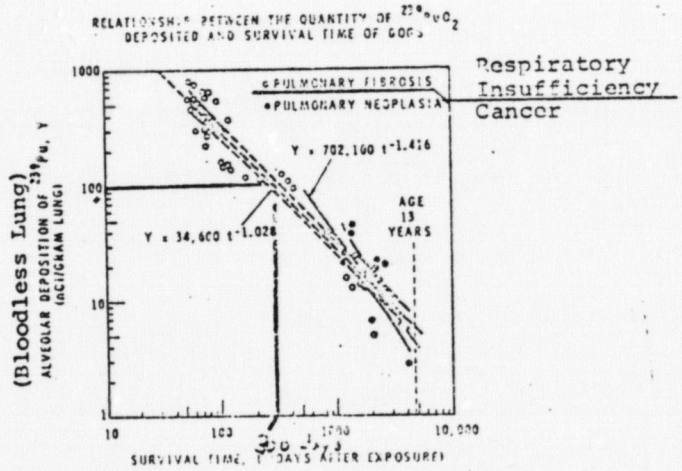
→ 430

942

After discussing the purposes of my analysis with him he agreed that dose rates from alveolar deposition in Beagles in the region of the graph dominated by death due to pulmonary fibrosis represented an acute dose. At this dose rate he felt confident that humans would suffer similar somatic effects and die within a similarly short period of time. I therefore picked 100 nCi/gram (nanocuries per gram) of bloodless lung tissue as a representative dose rate for my calculations. I also contacted other physicians who concured with this approach. Though this approach to the prediction of human response is not entirely satisfying from a technical standpoint, a terrorist could certainly be confident that he would kill most of the members of the exposed population within a short period of time utilizing these numbers.

Wash 1320 - A RADIOBIOLOGICAL ASSESSMENT OF THE SPATIAL DISTRIBUTION OF RADIATION DOSE FROM INHALED PLUTONIUM, Sept. 1974

Figure III



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PLUTONIUM UPTAKE CALCULATIONS

Given

Lethal dose to human = 0.1 mCi/gram Bloodless Lung (from Figure III)

Breathing rate for human = .742 ft^3/minute (from ICRP No. 2, 1959)

Weight of human lung = 580 grams. (no blood) (Radiation Health Handbook, 1970)

Efficiency of lung deposition = 25% (from Dr. Geesaman, personal communication)

Efficiency

$$0.1 \text{ mCi/gram of lung} \times \frac{1}{.25} = 0.4 \text{ mCi/g Lung}$$

Toxicity

0.4 mCi/gram of lung x 580 grams of lung/lung = 232 mCi/Lung

Therefore

232 mCi/total lung must be inhaled to cause pulmonary insufficiency and eventual death in humans.

PHYSICAL CONSIDERATIONS

Since we now know that if a human inhales 232 mCi of plutonium he will probably die, it becomes relatively easy to determine the total plutonium necessary to properly contaminate the air of a specific area for example, 10 floors of a World Trade Center tower. Referring to Figures I and II, we see that after injection into the air conditioner the concentration first increases until the material is completely dispersed throughout the 16 floors and then it decreases as new air is drawn in displacing the contaminated air. Eventually the air itself becomes relatively decontaminated. Unfortunately, any movement of furniture or papers would immediately resuspend the plutonium which had settled out in each room.

If we integrate under the curve in Figure II we can ascertain the cumulative exposure during an 8 hour work day. Multiplying this number, (X) $\frac{25.21 \text{ mCi min}}{\text{ft}^3}$, times a human's breathing rate, .742 ft^3/min, we will obtain the number of mCi each individual will breathe into their lungs during this day, 18.70 (X) mCi/lung.

From the above we already know that 232 mCi/lung is necessary to kill a human. An equation then, can now be setup yielding X, the multiplication factor, equal to 12.41. (See calculations that follow).

$$(X)\ (25.21 \frac{\text{mCi min}}{\text{ft}^3})\ (.742\ \text{ft}^3/\text{min})$$

= 18.70 (X) mCi/lung (which will be breathed by exposed individual during a work day.)

---

232 mCi/lung = 18.70 (X) mCi/lung
X = 12.41 multiplication factor

$(12.41)\ (1.0\ \text{mCi/ft}^3)\ (5.44 \times 10^6) = 6.75 \times 10^7$ mCi
= 67.5 Curies

945

We know now that the concentration must reach (1.0) (12.41)=12.41 mCi/ft^3 in the air breathed by the exposed population. The volume of the 16 floors served by the fan is 5.44 million cubic feet. Simple multiplication, therefore, will yield the number of mCi necessary for injection into the air system causing death to all persons exposed--6.75×10^7 mCi, 67.5 curies.

One must not forget, that the exhaust from the air conditioner will contaminate the metropolitan area surrounding the towers. The resulting hazard to a population exposed there could be computed in the same way Dr. Marvin Resnikoff did for an accidental release at the airport in his affidavit.

WEIGHT OF THIS INJECTION

To determine the weight of plutonium comprised in 67.5 curies, one must ascertain the specific activity (curies/gram) of the plutonium in question. These figures must be modified to account for differentials in hazard due to the presence of various other isotopes of Pu in a mixture stolen by a terrorist. This information is available in Table 1 of Marvin Resnikoff's affidavit, part of which has been reproduced below. (Some slight modifications to this table have been made to refine slide rule computations).

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FIGURE IV

Isotope	% by Weight	Weighted Ci/g	(1) RBE	Biologically Effective Ci/g
Pu-238	0.596	.1007	1	.1007
Pu-239	72.005	.0442	1	.0442
Pu-240	18.692	.0411	1	.0411
Pu-241	7.005	7.9717	.001	.00797
Pu-242	1.655	(negligible)		
		Total 8.156 Ci/g		Total .19397 Ci/g

Therefore

Biologically effective specific activity equals .19397 Ci/g

(1) RBE taken from Dr. Resnikoff's Table 1, Pu Conversion factor. Specific activity of Pu-239 considered equal 1.0 because this isotope was used in Beagle dog experiments. This method of dose equivalency is also borne out by Dose Commitment Numbers supplied for these isotopes in ORNL - 5003, February, 1975. Here too, Pu-241 is 1/1000 as hazardous as the other 3 isotopes for a dosage over 50 years of life.

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Since it is clear that the plutonium shipped has specific activity in a biological sense of .194 curies per gram, we can divide the total curies necessary (67.5) by the specific activity to obtain 347.9 grams or 12.3 ounces.

Since, at the very least, a plutonium bomb must contain around 6 - 8 kgs. of Pu (PLUTONIUM, Taube, 1964, pgs. 111 and 218) aerosol dispersion of 12.3 ounces (about 1/3 of a "tuna fish" can) represents a devastatingly efficient use of a lesser amount if a terrorist is unable to divert enough material for weapons manufacture.

I have used dose commitment equivalency for Pu-241 equal to 1/1000 that of the three (3) other important isotopes in this mixture. (See foot note to Figure IV). This equivalency results in a substantial underestimate of the hazard this plutonium mixture represents when delivered to humans in so massive a dose. Since Beagle dogs exposed to a dose Pu-239 at 100 nCi/gram of Lung only survived 300 days, I expect humans so dosed will also die within a similarly short period of time This period of time eliminates the short half-life component of Pu-241 (13.2 years) as used in the Dose Commitment Number calculation. Instead of a dose commitment number of 1/1000 for Pu-241, it would be much larger. Therefore instead of 12.3 ounces necessary to dose the population at risk, far less would be sufficient.

Due to the sensitive nature of the information contained herein, it is respectfully requested that the Court seal this affidavit.

Peter N. Skinner

PETER N. SKINNER

Sworn to before me this
2nd day of May, 1975

Assistant Attorney General
of the State of New York

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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

----------X

THE STATE OF NEW YORK,

Plaintiff,

- v -

THE NUCLEAR REGULATORY COMMISSION, et al.,

Defendants.

AFFIDAVIT

75 Civ. 2121 (WCC)

----------X

STATE OF NEW YORK)
: SS.:
COUNTY OF NEW YORK)

THEODORE MASON, being duly sworn, deposes and says:

1. I reside in Hastings-on-Hudson, New York, and maintain my business address at 330 Madison Avenue, New York, New York, where I manage a systems analysis and venture capital consulting business, Ted Mason Venture Associates, Inc. Additionally, I am a Commander in the Naval Reserve and Commanding Officer of a Mobile Inshore Undersea Warfare Unit. I have considerable experience in systems analysis as applied to military problems and knowledge of tactics and weapons which might be employed by para-military terrorist groups. I coordinated the investigatory work of various parties providing information for this affidavit. The background of my principal collaborator, Robert R. Leamer, is provided below. Attached hereto as Exhibits "A" and "B" are curricula vitae for Mr. Leamer and myself.

ROBERT R. LEAMER, being duly sworn, deposes and says:

2. I reside in Larchmont, New York, and maintain my business address at 330 Madison Avenue, New York, New York, where I manage a development services and project consulting business, Parametics International, Ltd. Additionally, I am

a Lt. Commander in the Naval Reserve, and am a special staff assistant to a Mobile Inshore Undersea Warfare Unit, being in an advisory capacity in the areas of demolitions and ordinance. I have considerable experience in explosive ordnance disposal, fusing devices, calculations of charges, shape charge design and demolition techniques. I have a good working knowledge of weapons, explosives, and ordnance, both civilian and military, and have a high aptitude for feasibility and workability of mechanical devices. I am familiar with para-military terrorist techniques, having completed courses in parachuting, rope climbing and counterinsurgency methods. While I was in the U.S. Navy UDT Teams from 1962 to 1964, I was involved in studies of terrorist techniques and countermeasures for use by U.S. Navy SEAL teams in Viet Nam.

Purpose of the Affidavit

3. This affidavit is submitted in support of plaintiff's motion for a preliminary injunction, with regard to the possibility of terrorist activities directed toward destruction or seizure of special nuclear material or SNM. Specifically, there is a substantial likelihood that a highly motivated group of terrorists (one or more) could be successful in destroying, or seizing for destructive use as a dispersant or in the manufacture of a nuclear bomb, SNM in the course of air transport, or related connecting transport, notwithstanding existing safeguard regulations and/or actual practice.

4. Additionally, this affidavit is submitted in support of the plaintiff's motion by way of presenting the position that the military has the current capability to move SNM by surface transport which represents significantly less vulnerability to terrorists than that posed by commercial air transport and related connecting transport.

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Approach to Analysis

5. We realize that a systematic analysis of the risk of death, injury or damage as the result of terrorist action directed against SNM in the course of air and related connecting transport involves, broadly speaking, assessing:

a. the nature of the threat;

b. ability to counter the threat; and

c. destructive effects.

6. Inasmuch as the potentially destructive effect to man of SNM in the hands of a determined group of terrorists has been documented elsewhere by Peter N. Skinner, affidavit of April 29, 1975, and Marvin Resnikoff, affidavit of April 25, 1975, with respect to plutonium oxide aerosols, and it is widely accepted as to the destructive effect of even the most crude nuclear bomb, no attention is directed to destructive effect herein.

7. Regarding the nature of the threat and the ability to counter it, we have chosen to treat those questions in the general analytical framework presented in the Presidential Report to the Congress Regarding Laws and Regulations Governing Nuclear Exports and International Nuclear Safeguards, March 31, 1975 (pages 65 and 66).

8. That general analytical framework recognizes that terrorist actions leading to harmful societal consequences necessarily take place in a sequence, which usually consists of a preparatory phase, an access and acquisition phase and, in the case of theft, a utilization phase. These could include several or all of the following activities:

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(1) decision to cause and produce the event;

(2) organization of perpetrators;

(3) planning of attempt;

(4) acquisition of physical resources;

(5) acquisition of information on material location and protection;

(6) external penetration of facility or vehicle;

(7) access to facility;

(8) control of vehicle;

(9) access to material;

(10) destruction and/or manipulation of equipment or material;

(11) removal of material;

(12) construction of explosive or dispersal device;

(13) delivery to event location; and

(14) event-detonation, critical incident, or dispersal.

9. After dealing briefly with the credibility of the threat, which relates to activities (1) and (2) above, we identify the specific nature of a limited number of terrorist options, or action plans, which we believe to be feasible and as having a high likelihood of success if implemented by a well motivated, properly trained, and adequately equipped terrorist group.

10. We deal with air transport and the related ground transport link separately, addressing for each, both a series of action plans (threats), and our perception of the currently existing ability to counter the specific threats.

11. We believe it important to point out that action plans which call for aircraft hijacking and destructive dispersal of SNM while in the aircraft, at the airport, or in subsequent

related surface transport are relatively simple in that the terrorist need only complete five or six of the above described events and to then retreat from the area for his (their) own safety.

12. However, seizure, removal and later use of the SNM calls for planning and execution of a greater number of events. Some of these events are more difficult; others more subject to defensive actions; and yet others require greater logistic and technical sophistication.

13. The feasibility of destructive action using SNM subsequent to seizure by terrorists is commented upon both with respect to its employment as a dispersant and in a nuclear explosive device.

Nature and Credibility of the Threat

14. It is well recognized that it is extremely difficult to predict with any degree of accuracy as to why, and more particularly, when one or more terrorists would organize to produce a harmful event. However, it is possible to state, based upon information from the Intelligence Division of NYPD and the Criminal Investigative Division of the U.S. Army, Fort Hamilton, New York, that one or more organized terrorist bodies exist in the area which are capable of planning relatively sophisticated terroristic operations.

15. New York Police Department Intelligence Division indicated that three categories of terrorist personnel were of potential concern:

(1) Recognized, organized groups such as:

-- Weather Underground

-- FLAN

-- New World Liberation Front

-- The Red Guerrila Family

(2) Highly motivated individuals or similar smaller groups operating independently of recognized larger organizations, but with similar socio political motives.

(3) Individuals which take terroristic actions against persons and property for motives largely individualistic in nature.

Further information on these and other groups is available both in the press and internal security organization files. The general availability of weapons and instructions on how to use them was confirmed.

16. We do not deal with the question as to why or when groups such as those described would decide to take action against SNM. We proceed from the knowledge that organized terrorist groups do exist, that a specific motivation may exist or develop, and that these groups command the resources and sophistication to execute various of the options we have identified, or similar such actions.

17. We note that David Krieger, in his article Terrorists and Nuclear Technology, in the Bulletin of the Atomic Scientists, p. 29 (June 1975), expresses the view that a terrorist group, intent upon gaining control of SNM, would most likely steal it from the nuclear power industry in preference to buying it from smaller, potentially sympathetic nation states. We believe theft in transit is the easiest course of theft for a terrorist group to pursue.

General Options Available

18. In order to present any intelligent discussion of the threat outlined above, it must be assumed that a decision has been made by a competent group of terrorists to organize, plan out and initiate a definite action plan. Among others, the following action plans exist:

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a. Hijacking of Aircraft at Point of Departure-- Terrorist group physically boards aircraft at point of departure and, through radio communications, threatens to detonate flight, or disperse the SNM over airport or urban area.

b. Detonation of Explosive Device within Aircraft-- A barometric, timed or radio-fired device which was implanted into the cargo hold of the transporting aircraft prior to takeoff and detonated upon takeoff, approach, landing or on a taxi way.

c. Destruction of Aircraft containing SNM during Takeoff, Landing or Taxiing -- Shooting down or detonating an aircraft transporting SNM by conventional or more sophisticated methods.

d. Destruction or Detonation of SNM at Loading Ramp -- Neutralization of any security force established at the loading ramp area and, by use of explosives and/or weaponry, destruction or detonation the SNM in place on the plane, on the loading ramp, in the vault storage area or in one of the transport trucks.

e. Seizure and Removal of SNM from Airport Area -- Initiation of an action plan wherein, by overt (armed), or covert (theft) means, the SNM is seized and removed from the airport for later use, i.e., propaganda, threats and intimidation, dispersal and/or nuclear bomb construction.

f. Seizure and/or Detonation of SNM during Truck Transport between Airport and Destination -- Methods of overt action which could be employed for seizure and/or detonation during ground transport interval.

19. The first four action plans noted would most probably not result in a nuclear explosion, but would be of a chemical nature, causing minute radioactive particles and debris

to be spread over an area limited only by the size of the explosion, and wind and weather conditions. The last two plans could result not only in a blackmail posture by the terrorist group, but in dispersal of the SNM in chemical form and/or the extreme possibility of a nuclear explosion, given the assumptions and supporting evidence presented later in this affidavit.

Information

20. According to Peter N. Skinner, affidavit of April 29, 1975, a minimum of 124 people had knowledge of the details of the arrival of a specific shipment of plutonium before it arrived at J.F. Kennedy Airport from Brussels on February 25, 1975. With any amount of effort at all the terrorist group could, in all probability, gain access to this knowledge and, with readily available communication and monitoring devices, establish the identity of the transport aircraft, its approximate ETA, its ramp destination and the proposed method of transport from the airport. With this knowledge, there are several methods available to a terrorist group whose objective is purely destruction of air transported SNM, within or in close proximity to the airport.

Discussion of Options

21. The problems and proposed solutions of hijacking or air piracy have been debated and analyzed in great detail for the past several years and will not be discussed herein. It will simply be stated that if a terrorist group were to decide on that action plan, with detonation or dispersal of SNM being their objective, then the means of gaining access and entry to an aircraft containing SNM could most probably be accomplished by such a determined group.

22. Similarly, the question of placing a timed, barometric or radio-fired bomb aboard an aircraft and later detonating it has been analyzed at great length elsewhere, and it is sufficient to say that several devices, from both commercial and military sources, are available to initiate this type of detonation and destruction.

23. The means with which to shoot down a low flying aircraft are readily available, by both conventional and more sophisticated methods.

(a) A 20MM cannon, either single or twin, could easily be mounted on the flatbed of a pickup truck, inside an opened roof delivery van, or at J.F.K. airport, on a motor launch in the bay, and the group could simply shoot the aircraft down on its approach or takeoff. The 20MM, with a rate of fire of 1600 rounds/minute and the ability to fire alternating incendiary and armor piercing rounds, is more than adequate to bring down any aircraft within its kill range of 1500-2000 yards.

(b) Upon highly reliable information and belief, other more sophisticated and efficient ground-to-air weapons are clandestinely available, including wire-guided and heat-seeking types. An article in the February, 1975, U.S. Naval Institute Proceedings, by Peter A. Wilson, categorizes these many weapons as BGWs, or Battleground Guided Weapons, and describes them as follows:

(1) They require relatively little training.

(2) They are very difficult to detect before launching.

(3) They give an individual a high single-shot kill probability.

(4) They require relatively low maintenance.

(5) They have a very small unit cost ($5,000 to $15,000).

(6) They are highly potent against heavy tanks and jet aircraft, and for these reasons, are likely to proliferate rapidly on a world-wide basis.

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(c) To describe just one ideal type of such weaponry in a limited manner, the LAW, or Light Anti-tank Weapon, is a totally self-contained weapon of about 2 1/2 feet in length (extendable to 4 feet), having a projectile of about 3" diameter, a shaped charge high explosive warhead and an accurate range of 1000 yards. A single man can carry eight or ten of these weapons at the same time and can fire them at a rate of about 5 per minute.

(d) There is no doubt that individuals with access, ingenuity and resources, could obtain one of the above described or similar weaponry for in-flight destruction of a low-flying aircraft.

24. Mr. Donald A. Nussbaumer, in his affidavit of May 29, 1975, spells out the four sequential tests which type B containers are subjected to in order to assess adequacy of design under NRC Regulations on container integrity. Markedly absent is a test which would indicate the effects on the container of proximity to, or being actually within, a massive explosion of the type commonly associated with aircraft accidents, and generally caused by rapid ignition of high octane jet fuel. In the case of terrorist detonation, the additional effects of a high explosive with a great shattering effect, or brisance, must be added to the probable jet fuel explosion. Further, in the case of projectiles being fired into an aircraft, or into the container directly, the penetration aspects of the ordnance must be considered. Even without a direct hit on the center of the external drum, the internal container holding the SNM would very possibly be ruptured, and a direct hit would most probably completely shatter the internal container and cause wide dispersal of its contents.

25. As with the above noted action plans, the same weaponry and/or explosives could be used to destroy or detonate the SNM on the airport grounds, once the area around the plane and the ramp had been neutralized and controlled by the terrorists. Seizure and removal of SNM from the airport area for later use will be discussed at a later point in the affidavit.

26. Based upon information and belief, SNM is being transported to and from J.F.K. by commercial truck transport. We have no information regarding transfer of commercial SNM by rail in the surface transport link to or from J.F.K. or to or from any other domestic commercial airport, although such may be the case. Hence, our vulnerability assessment has been addressed to the truck transport mode.

27. We believe there are two broad considerations in evaluating the significance of the potential vulnerability of the commercial truck transport mode:

a. the proximity of the point of origin, destination, and the transit route to large population centers or other areas of special significance.

b. the specific vulnerability of the truck or convoy.

28. If the transit route goes through a populated area, or adjacent to a reservoir, or other zone where immediate dispersal of the SNM can have significant impact, it appears reasonable to assume the terrorists' have two relatively simple action plans open to them:

a. destroy the truck and breach the containers of SNM, thereby achieving dispersal of the SNM, by firing a number of rounds of conventional projectiles into the truck and its then exposed cargo.

b. Seize the truck, enter it, access its cargo, and then disperse the cargo immediately by a more effective means - such as placing the powder form of plutonium oxide in a rocket or mortar projectile which has been specially prepared to receive, carry aloft, and disperse upon explosion its contents.

29. The potential advantage of either of these two options lies in immediate dispersion, i.e., accomplishment of a serious terrorist act, without having to successfully escape the scene encumbered by a bulky cargo. Clearly these options are relatively simple to effect, but cannot have full impact unless the transit route goes through or near high population, or otherwise sensitive areas.

30. In the case of air transport through J.F.K., the related truck transport necessitates transit through an extremely desirable target area, New York City.

31. Accordingly, any method of long haul transport which eliminates the necessity of related truck transport through a sensitive area will substantially reduce both the incentive for, and the impact of, a terrorist act directed against truck-borne SNM.

32. The specific vulnerability of a commercial truck or convoy to terrorist attack is high. Assuming that the terrorists have knowledge that a shipment of SNM has left the airport through advanced intelligence or direct observation at the airport, it then becomes largely a matter of identifying the route to be taken and picking appropriate ambush points. Identifying the route can be accomplished in a number of ways:

a. observing past patterns;

b. determining what routes are legally available for hazardous materials under existing ordinances;

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c. obtaining advance intelligence;

d. monitoring communications made by the shipper, trucking service, or law enforcement authorities, before and/or during the actual transit. This can be accomplished by telephone taps, or purchase of a police band or a variable frequency radio receiver capable of listening in on convoy communciations;

e. bugging the truck ahead of time with a radio transmitter so that tracking its position is possible; or

f. identifying choke points near the transit route's origin or destination which the truck must pass through regardless of the route selected for the greater portion of the trip.

33. Assuming a terrorist faction has been able to establish one or more points suitable for intercepting or ambushing the truck convoy, the vehicles may be identified without difficulty. The cover of night would not shield the identity of the target truck if the terrorist employed NOD gear (Night Observation Device) which allows the user to view the landscape as if it were broad daylight.

34. The choice of weapons previously described depends upon the terrorists' objective - to destroy the target truck and its cargo or to stop the truck and seize the cargo. It is not probable that the terrorist would attempt to pirate the target truck since it is clearly identifiable.

35. Clearly, it is in the terrorists' interest to intercept the truck convoy after a recent radio check (which he can monitor) and to neutralize all elements of the convoy simultaneously so that a request for assistance can not be sent off by the target truck or its escorts. Failing a simultaneous destruction of the convoy elements, the terrorist could employ communications jamming equipment to block or drown out any potential transmissions requesting help by elements of the convoy.

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36. Having stopped the convoy, prevented any requests for assistance, the terrorists would open the target truck, transfer the SNM cargo to another truck or helicopter and leave the scene. The fact the transit was accomplished at night would now run to terrorists advantage and assist their escape - the darkness and the low level of readiness of law enforcement authorities serve this purpose.

Feasibility of Destructive Action Subsequent to Seizure: Nuclear Bomb Construction

37. We will not comment on the affidavit of Maj. Gen. Ernest Graves, Jr., dated May 29, 1975, except to say that he does not at all disclaim the fact that a nuclear bomb could be fabricated by a group of motivated and dedicated individuals with readily available material and somewhat specialized abilities. In pointing out Mr. Skinner's alleged deficiencies, he reinforces the fact that many individuals, including himself, have the knowledge and latent ability to build such a homemade device.

38. In almost every article on the subject, the statements of two highly qualified experts in the field are quoted, Theodore Taylor and Mason Willrich. Among other conclusions they set forth at page 167 in their 1974 report to the Energy Policy Project of the Ford Foundation entitled "Nuclear Theft: Risks and Safeguards" is that "Nuclear weapons are relatively easy to make, assuming the requisite materials are available." They further state, at page 21, that the other materials are readily available, and the only item that one might have to steal is plutonium or other fissionable material.

39. In March, 1972, E. M. Kinderman of Stanford Research Institute made the following statement:

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"The basic information necessary for design of a plutonium based nuclear explosive is available in official and unofficial documents. One or a few competent physicist-engineers could probably arrive at a tentative design in a year or so. A chemical engineer and a metallurgist could consult basic primers on plutonium chemistry and metallurgy and learn enough to buy or construct the essential equipment, make essential tests, and alone or with some help, operate a plant to produce the product dictated by the bomb designer. Others will be needed for design and construction of the miscellaneous parts."
E.M. Kinderman, "Plutonium: Home Made Bombs?" in Peaceful Nuclear Exports and Weapon Proliferation, Report of the Committee on Government Operations, April 1975 at 26.

Kinderman concurs with Dr. Taylor who says, "If the question is what does it take to build a nuclear explosive of the type that is in the Minuteman missile, there is one answer. If the question is, what does it take to build a device with a completely unpredictable yield, with a two-out-of-three probability that it would yield more than a tenth of a kiloton, and could be carried in a car, you get a very different answer." The Washington Monthly, T. Ingram, Nuclear Hijacking: Now Within the Grasp of Any Bright Lunatic, January 1973, p. 35.

40. In support of Mr. Taylor's often stated contentions concerning the ease with which a nuclear device can be constructed, Mr. David M. Krieger, at page 31 of his article published in the June, 1975, Bulletin of the Atomic Scientists stated that, "Theodore Taylor, one of the authors of the aforementioned Ford Foundation study on nuclear theft and himself a former nuclear weapons designer, argued before a Senate Government Operations subcommittee that a single terrorist with 15 pounds of plutonium could construct a crude nuclear weapon capable of killing tens of thousands of people. The AEC's chief of national security,

E. B. Giller, discounted Taylor's claim before the same subcommittee, but admitted that a nuclear bomb could be made by a 'competent group' of terrorists."

41. A three part article written by John McPhee and entitled, "The Curve of Binding Energy", a profile on Dr. Taylor, appeared in the December 3, 10, and 17, 1973, issues of the New York Yorker Magazine. Among numerous other very enlightening comments on the subject, details are set forth on how to build both of the "common" types of nuclear devices, the projectile type and the implosion type.

42. D. B. Hall of the Los Alamos Scientific Laboratory, in a symposium on Implementing Nuclear Safeguards, Kansas State University, October 25-27, 1971, stated that, in addition to plutonium, "almost all forms of fully enriched uranium -- greater than 90% -- constitute a real-not an imagined-hazard as an explosive device." (See Exhibit "C", p. 8).

43. Concluding with a statement on the feasibility of homemade nuclear bomb construction, it seems fully possible that a terrorist group, properly motivated and organized, could attempt to construct such a device and have a reasonable chance at success. Even if they made an error in the process, and a premature detonation took place, the contamination factor of a non-nuclear explosion, or the holocaust of a super-critical atomic explosion, would in all probability take place in a somewhat populated area, with resultant death, injury and devasting destruction.

Mechanical Dispersal Options

44. If a group of terrorists has possession of plutonium oxide powder, they have a number of dispersal options. Some of these are:

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a. release into building ventilation system;

b. introduce into a water supply or reservoir;

c. release from a helicopter or other aircraft;

d. employ an 81 mm mortar or similar weapon to shoot a plutonium filled projectile aloft with subsequent detonation and dispersal.

Current Security Practices

45. Because of severe time constraints and the sensitive nature of the information sought, it was not possible to conduct a thorough survey of current security practices in use at JFK International Airport or in related connecting transport. However, based upon discussions with various informed parties and a tour of selected airport facilities, we make certain observations in this subsection.

46. Organizations contacted included airlines, Port Authority Police at JFK, an air cargo planning consultant with prior experience at JFK, the Airport Security Council, and a security service organization.

47. Regarding connecting ground transport to JFK, it is our understanding that the means of transport is trucks. Such truck transport is provided by sub-contract organizations or the fuel processing licensee who is either importing or exporting the SNM in question. Practice varies and the level of security provided varies.

48. Although we cannot say categorically that armored cars are never used to transit SNM between JFK and ultimate origin or destination points, it is our impression that non-armored vehicles are used most of the time. Escort by NYPD is provided to such vehicles within the city. It is not apparent what type escort is provided subsequently and by whom. Again actual practice may vary among organizations.

49. We have been advised by New York Port Authority Police and a private security firm that it was highly unlikely that the trucks employed in moving SNM were equipped with inmobilization devices. We were also advised few, if any, armored cars in current commercial use are equipped with immobi'ization devices. Additionally many vehicles appearing to be armored cars are not in fact armored at all -- they simply present that appearance.

50. In terms of truck routing it is noted that the New York City Health Code requires SNM be moved over Truck Routes. This requirement, while beneficial in some ways, could assist terrorists in selection of potential intercept points. Further, as referred to elsewhere in this affidavit, the number of persons with advance information on a SNM movement lends to compromise of restricted information necessary to plan an ambush of SNM moving through the city.

51. Upon information and belief most private security personnel employed at JFK, and probably some of those that become involved in the movement of SNM cargo both on and between the airport and ultimate origins and detinations, are not adeuqately trained or equipped to deal with a terrorist attack. Attracting properly motivated personnel and providing them with appropriate training is largely an economic question.

52. Regarding security at JFK airport, the concensus of opinion seems to be, and we concur, that a determined attack by a terrorist group would succeed in the destruction, detonation and/or the possible seizure of SNM. The possibility of escape from the airport area is a debatable question, this factor being controlled by the time involved in police notification and their reaction time. Official sources state that only a 2-3 minute interval elapses from time of notification to time of arrival at almost any point in the airport.

53. Upon information and belief, it is felt that security at the airport has been substantially improved in the past few years. Theft of non-strategic and high value cargo has decreased because of precautions taken by the airlines and airport officials, but a difficulty is that each airline or licensee follows its own security guidelines, depending on its own economics and attitude. Some licensees pick up SNM using their own panel trucks and guards, while other sub-contract for such services with outside contractors, either from the airport area or beyond. Some licensees advertise and publicize the fact that they have good security control over SNM and high value cargo in order to increase their business trade. Most of the parties involved do provide some security, but each to a greater or lesser degree and no rigid guidelines appear to be followed.

54. Upon reliable information and belief, the Port Authority Police will provide reception and escort service to a carrier bringing SNM into the airport area for export or upon being notified by an importing transport company that a shipment is arriving. However, this is only done if the airline requests it. Also, the Port Authority police and fire marshall only know about any shipment of SNM if the airline or licensee notifies them, which not all seem to do. The Port Authority Police have two men specially designated for escort service, and also have an armored car available which can carry at least two men with automatic weapons in case of emergency. This armored car is radio equipped.

55. Even though there has been a marked reduction in theft at JFK airport in the past few years, access to and egress from most areas seems to be controlled by only the use of badges, pouches and car stickers. Needless to say, these security devices can be counterfeited or illegally obtained by interested parties and used effectively, possibly even precluding the necessity of

of using more violent methods. Bribery, false documentation, collusion, use of communications intercepts, clandestime listening devices, stealth and deceptions of every conceivable means all contribute to the possibility of successful theft of SNM without resorting to violent methods. The threat of successful employment of these methods increases substantially when the vast majority of persons involved in, or with knowledge of, a SNM movement have not received security clearances.

56. Since AEC regulations in 10 CFR Part 73 were republished on December 28, 1973, several articles have appeared in support of more stringent and effective safeguards. As they stood in December 1973, these safeguards were not adequate to prevent or deter a determined group of terorists from succeeding in their mission.

57. In her remarks before the 4th International Symposium on Transportation and Packaging of Radioactive Materials, on September 24, 1974, Dr. Dixy Lee Ray, Chairman of the AEC, indicated several times the need for continued reevaluation and updating of the U.S. safeguards program.

58. Upon information from a member of the U.S. Army Reserve having a familiarity with the transport of munitions, we understand the following:

a. The army chain of command responsible for the movement of munitions and probably nuclear materials is:

Army Material Command

Army Munitions Command

Army Technical Escort Center (which is understood to be located at Edgewood Arsnel, MD.)

b. The Army is fully equipped to transport a variety of fissionable materials and, in order to develop and maintain expertise in the safeguarding of same, regularly engages in defensive transportation exercises.

59. Upon information from a U.S. Army CID Agent located at Fort Hamilton, New York, we understand that:

a. the immediately preceeding information is essentially correct.

b. That it should be reasonably obvious to anyone, by simple logic, that the Army has nuclear weapons and hence a sophisticated capability for their safe transport and that land surface transport is among the options.

60. It is our belief that it is reasonably obvious the U.S. military has the safeguards capability to transport SNM by sea and that such material would be quite well-shielded from terrorist action.

61. It is our belief that it is also reasonably obvious that use of military bases as points of shipment or receipt, and interim storage between water and land transport modes, can provide a relatively high degree of physical security to commercial SNM in transport.

62. There appear to be surface transportation options available for the movement of SNM which are significantly less vulnerable to terrorist action than commercial air and related transport.

THEODORE T. MASON

ROBERT R. LEAMER

Sworn to before me this
16th day of June, 1975

Assistant Attorney General
of the State of New York

THEODORE T. MASON

Mr. Mason, holds a B.S. in Marine Engineering from the State University of New York Maritime College and a MBA in Finance from Columbia Graduate School of Business.

Mr. Mason holds the rank of Commander in the U.S. Naval Reserve, and is currently Commanding Officer of a Mobile Inshore Undersea Warfare unit. Recently, at the request of the Chief of Naval Operations, Naval Inshore Warfare branch, Mr. Mason planned and then served as initial project manager for a several hundred thousand dollar study of Naval Inshore Warfare.

Mr. Mason prepared and delivered a nationwide Cost Effectiveness Seminar that explains the role of systems analysis in defining, costing and selecting the best of alternative weapon systems.

Mr. Mason has considerable earlier experience in systems analysis applied to management problems and has made significant contributions to cost effectiveness and cost benefit analysis, incentive contracting; systems management, and long range planning as applied to the marine and aviation industries.

As a member of the management consulting staff, Peat, Marwick, Mitchell and Co., Mr. Mason evaluated the economic trends and technical developments expected for the next thirty years in order to recommend land use for air cargo operations at the Dallas-Fort Worth Regional Airport. He made similar master planning and scheduling recommendations for the design and construction of new terminals at Arlanda International Airport, Stockholm, Sweden.

Mr. Mason prepared policy guidelines for management of airport and mass transit projects funded under New York State's Capital Grant Program. He was project manager for Peat Marwick's management and technical assistance support of the Technical Director of the Navy's Spruance Class Destroyer acquisition. He was responsible for organization of the Maritime Management Institute's 1968 Conference, "The Challenge of Transmodal Ship Operations."

Mr. Mason's consulting experience prior to the joining Peat, Marwick, Mitchell and Co. included advising a large aerospace firm's Fast Deployment Logistic Ship (FDLS) Program Manager on organization, technical approach and proposal preparation for design and construction of the FDLS Fleet. He managed a substantial consulting effort on system effectiveness; influenced ship design concepts; fully defined the work breakdown under the billion-dollar contract; designed the incentive contract provisions; and developed a fleet management program to minimize life cycle costs.

Mr. Mason is also president of Ted Mason Venture Associates, Inc., a New York based management consulting firm. He is heavily experienced in risk-oriented analysis, having served as principal, investor, director and/or financial consultant to a variety of firms over the past five years in the following industries: insurance, venture capital management, money management, manufacturing and technology, service, oil and gas, and transportation.

ROBERT R. LEAMER

Mr. Leamer has a J.D. degree from the University of San Diego, School of Law, San Diego, California, and an A.B. degree in Geophysical Sciences from the University of California, Berkeley, California.

Mr. Leamer has substantial prior experience in the analysis, testing and application of explosive effects. As a research engineer for Narinco Industries, San Diego, California, Mr. Leamer conducted, or was involved in, the following research studies: heat abation and flash-point testing for the Aerojet General Aerobee rocket; pre-ignition explosion studies on a prototype liquid hydrogen rocket engine for General Dynamics Corporation; sound attenuation and propagation studies on submersibles for Electric Boat, a division of General Dynamics Corporation.

Mr. Leamer's related military experience in dealing with explosives was in a U.S. Navy Underwater Demolition Team, during which time he received extensive training in diving, demolitions, and marine salvage techniques. During and after this period of military service, he consulted on several related projects while associated with Submersible Operations Corporation.

While with Submersible Operations Corporation, Mr. Leamer, with other associates, helped to develop a rapid and highly efficient method of removing slag from the inside of blast furnaces through the use of specially designed shape charges. This method is in common use throughout the industry today.

For the past several years, Mr. Leamer has worked in the fields of construction planning and engineering research. Mr. Leamer's experience includes site selection and feasibility

studies, market analysis and cost estimating, architectural design, contract negotiation, construction and demolition supervision, and management coordination.

Mr. Leamer has conducted feasibility studies and land use analysis for clients in Costa Rica, British Honduras, Haiti, Antigua, Mexico, Martinique and Canada and has acted as engineering and legal consultant during land lease negotiations with the Monserrat, B.W.I. government; he has also assisted a client form a Montserrat based company for future development, including land, agricultural and mining interests. Mr. Leamer has personally coordinated and supervised several major turn-key projects throughout the U.S.

Mr. Leamer has authored several articles on construction economics, diving and demolitions. He recently reviewed, "Contracts, Specifications and Law for Engineers," McGraw-Hill Publishing Company. He is a member of several professional societies and presently holds the rank of Lt. Commander in the U.S. Naval Reserve.

LA-DC – 13114

ADAPTABILITY OF FISSILE MATERIALS TO NUCLEAR EXPLOSIVES

by

D. B. Hall

cc:
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ADAPTABILITY OF FISSILE MATERIALS TO NUCLEAR EXPLOSIVES*

by

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This presentation is my attempt to answer the question which has been posed as "The Adaptability of Fissile Materials to Nuclear Explosives." Several speakers have touched on this subject in earlier sessions. There is little more that can be said and still stay outside the confines of classified data. It is not my intent to embarrass the AEC nor to give assistance to the criminal with malice in mind. What I am saying here represents my own thoughts as developed in the framework of my responsibilities as manager of the safeguards program at the Los Alamos Scientific Laboratory.

For the present purposes, it is necessary to define a nuclear explosion as opposed to a radioactive mess. The mess, as defined here, is not trivial -- it can be costly and embarrassing -- resulting in injuries or deaths but is not the disaster associated with a nuclear weapon. The present discussion will be restricted to explosions equivalent to tons of high explosive (HE), realizing that the effects of lesser amounts are intolerable in the extreme and can cause extensive damage. However, damage from amounts up to approximately one ton of HE can be achieved by conventional explosives which are easier to acquire and to handle, and are not excessive in size. The use of nuclear material will likely be contemplated only for very large effects, an order of magnitude above that attainable by conventional explosives. Whether or not the expectations are realized is a different consideration.

I found it necessary to consider (1) people and groups for insight as to capabilities and intent as they relate to materials, and (2) weapon properties of materials which are subject to diversion. First, who is it that is likely to be contemplating the use of illegal nuclear explosives? It could be:

*Work performed under the auspices of the U. S. Atomic Energy Commission.

(1) one or a few individuals acting on their own in irrational behalf,

(2) a group or organization dedicated to destruction of a country and its leaders,

(3) organized criminal activity for money,

(4) a minor, undefined nation in border dispute or internal rebellion,

(5) a major nation desiring to join "the club."

The order given is intended to be representative of increasing capability and decreasing probability or credibility. For any but the first (perhaps the second group, a theft of a significant quantity of ^{239}Pu or enriched ^{235}U would be required to attain objectives. One or two [illegible] would certainly cause panic, but would be unlikely to achieve [illegible] military objectives.

Many times, the question has been raised as to what could an intelligent person or group contrive in the form of a weapon, with no access to classified data. In one sense, asking the question is trying to assess the value of secrecy and classification, but in another it can serve to point out clearly the hazards confronting the world.

In 1947 a group at MIT headed by Clark Goodman developed a two-volume text entitled *The Science and Engineering of Nuclear Power* which confounded the classification officers and was effective in demonstrating the futility of the then existing classification rules. The rules are undeniably more rational now, but there is still a strong tendency of some individuals to deprecate their enemy, and not give him credit for equal or even superior intelligence. There have been controlled studies of the problem of designing a nuclear weapon without benefit of classified information. The fact that these studies were made is unclassified but any information about them or their success remains restricted data. To the best of my knowledge studies of this type have been limited to paper studies only. I am not aware of any attempt to actually fabricate a nuclear explosive under these simulated diversion conditions.

Indeed it is only necessary to reflect on the historical fact that Russia, France and China have successively and successfully joined the nuclear bomb club, originally founded by the United States and United Kingdom partnership,

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about with an extended testing program. It is significant also that each has gone from a fission weapon capability to a thermonuclear capability with shorter time development than the United States. The knowledge that a result has been achieved is of overwhelming importance in a development of the sort discussed here. As Theodore Taylor and others have said, there is no secret.

Information in Glasstone's *"The Effects of Nuclear Weapons"* suggests two methods of achieving a nuclear explosion: (1) a gun-like assembly of two or more subcritical pieces which when brought together form a supercritical assembly and (2) compression by a symmetrical implosion to achieve increased density. Of these two methods, the first is straightforward and might be approached with confidence. The second is perhaps more difficult, but cannot be dismissed from the present considerations.

It is recognized that since 1945, the number of individuals who have had exposure to weapon designs in varying degrees and in various countries and who are no longer in the trade is large and getting larger all the time. The same can be said for employment in uranium and plutonium processing facilities. In spite of the clearance requirements and internal compartmentalization, it would not be surprising if some of these individuals should belong to one or more of the groups categorized earlier. An even larger number of people have had university instruction in reactor physics with at least an introduction to fast reactor calculational techniques with virtually no control or knowledge of their social attitudes. This aspect increases the probability of the agent being successful, but does not materially make his job easier in the practical sense of fabricating a device. It is true that experimentation of a highly developed technical quality would be required to adapt diverted nuclear materials to the creation of a predictable high efficient military-type weapon. However, efficiency and predictability are not necessary to achieve some of the possible objectives, and a crude device of uncertain but large yield may be sufficient. It is not likely that many honest individuals have speculated seriously or care much about the details and problems of making a nuclear weapon. What follows may seem as though it is giving guidance to someone for his illegal bomb, which is certainly not the intent. One must assume the potential thief is intelligent and informed of the basic principles

of physics. If he is not, what is said here will not help him, and if he is, he will learn more than the present description from published works.

So, with that preamble, one can consider a nuclear bomb, choosing first a so-called gun type. It has been described as requiring the rapid assembly of at least two pieces. When assembled, the fission chain reaction will proceed with an exponentially increasing rate, controlled by the excess reactivity at a particular time. As energy is developed in the assembled mass, it heats up, expanding the fuel and, with reduced density, the criticality is reduced and the reaction stops. A shock wave -- or explosion -- develops only if the material motion, due to the release of energy, exceeds the velocity of sound in the material. Hence, there is a limit on the time in which the energy can be developed. Characteristic times are measured in hundredths of a microsecond, known as a "shake"; the whole reaction takes place in less than a μsec. If the excess reactivity is not large, the nuclear energy will not be developed rapidly enough to reach levels required for a nuclear explosion. Hence, if the reaction time takes as long as a millisecond, the full energy will not develop. The energy developed in 30 to 40 generations (10^{17} fissions) will cause a disassembly without major damage. The significance of this lies in the restrictions of the ratio of the two masses to be used and the amount of neutron moderation that can be permitted. Since speed of assembly is important, one might choose a small projectile and a large massive target. But the excess reactivity achievable by such a ratio may not result in an explosion. Maximum rate of reactivity addition would indicate the choice of two equal masses such as hemispheres divided on an equatorial plane. In this case, the physical momentum will make it difficult to retain them together without separation while the nuclear reaction initiates and develops.

In Nuclear Science and Engineering in 1960, a collection of papers dealt with fast neutron critical assemblies. Godiva -- a bare critical assembly of ^{235}U -- is described in detail with the following illustration. Two of the figures in one of the articles have been redrawn with some liberties, principally the unpardonable technical sin of extrapolating the data as presented (Fig. 1).

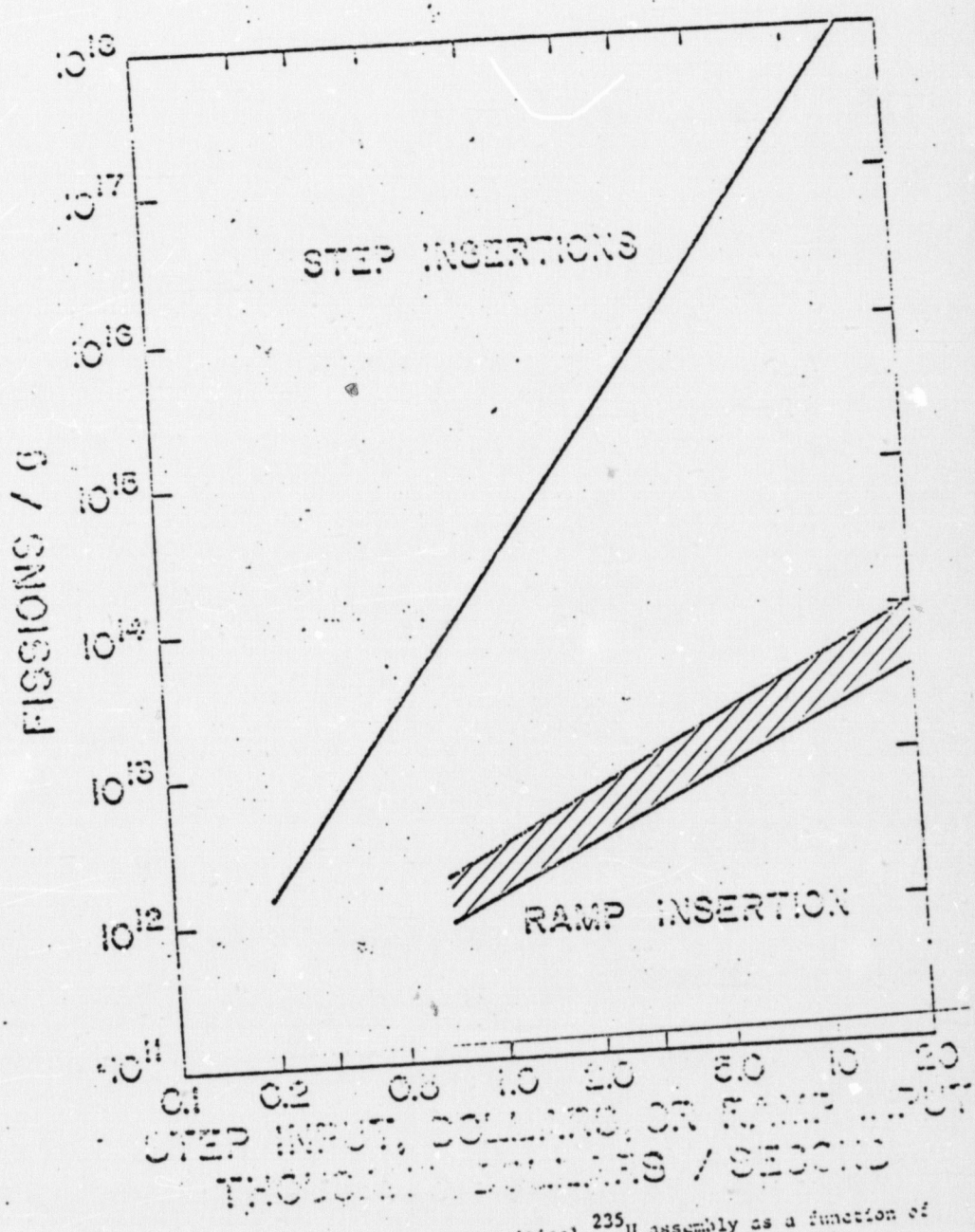

Fig. 1. Energy developed in supercritical ^{235}U assembly as a function of reactivity added either suddenly (step) or slowly (ramp).

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In the range of large reactivity insertions the resulting yield appears to increase proportional to the cube of the excess reactivity. A reasonable fit to the curve can be obtained by the expression $Y = 2.2 \times 10^{14} R^3$ (fission/gram), where R is the maximum reactivity in units of dollars.

So, if one can change the reactivity of the system by \$10, where \$1 is equal to a $\Delta k/k$ of 0.007, the reactivity would change from a safe subcritical of -\$5 to a supercritical state of +\$5. The formula then will predict a yield of 2.8×10^{16} fissions/gram. Godiva has a total mass of 50 kg, and remembering 1.25×10^{20} fissions is equivalent to a ton of HE, the total yield would be

$$Y = \frac{2.8 \times 10^{16} \times 5 \times 10^{4}}{1.25 \times 10^{20}} .$$

If the \$10 change in reactivity started at -\$2 and went to +\$8, the result would be 40 tons. Other examples can easily be worked out for different masses and reactivity changes. If one believes this extrapolation, \$18 supercritical would result in a kiloton explosion. Obviously, this simple projection will break down at some point. The mass of fissile material chosen for this illustration is 50 kg of fully enriched uranium. Glasstone and Sesonske, and other texts, describe how to substitute reflector material for core mass so that the material requirements are lessened. The total yield will also decrease.

Godiva-like systems are characterized by pure metal with very low neutron background. For a step insertion of 70¢ above delayed critical (-30¢ below prompt), an average waiting time of about 30 sec is required before a chance neutron starts a successful chain. This waiting time decreases in predictable manner for larger reactivity conditions as also described in the Nuclear Science and Engineering series.

However, if too many neutrons are present, a successful chain will develop at delayed critical conditions in the assembly process and the yield is much reduced. This type of insertion is described as a "ramp" and is characterized by the reactivity insertion being compensated by the energy build up. Disassembly therefore takes place at the earliest possible time. The more violent the assembly rate, the more violent the energy release, but it is almost linear with reactivity insertion rate (increasing to a 3/2 power

dependence). Large masses or high velocities are required to achieve the same results for a ramp insertion as with a sudden step increase, but explosive conditions can be achieved.

One can summarize the discussion to this point as follows. It is relatively easy to make a truly formidable, even though crude, nuclear explosive starting with highly enriched ^{235}U metal. With more difficulty, a less potent device can also be constructed from full enriched UO_2 or U_3O_8. The oxygen dilutes the uranium but it is a moderator, not a poison for neutrons. The moderation effect is not very strong, however, and one can estimate large reactivity coefficients and short neutron life times for a UO_2 device, depending on the final state of the material at the time of explosion and other design assumptions.

For lower enrichment uranium, even that typical of a fast reactor fuel, say 20%, explosions could be achieved but only by truly heroic efforts. If one calculates the result of the sudden reassembly of the fuel in a modern fast reactor into a perfect sphere, with its reflector intact, the answer is likely to be tens of kilotons yield. This result derives solely from the large mass of material involved. The motion required from a critical condition to a compacted sphere is too great to be practical. Restricting attention to manageable masses, the results, while expensive in the extreme, would not be that which has been defined here as a nuclear weapon.

Turning next to plutonium, the situation is strikingly different. Since uranium and plutonium are different elements, a separation by chemical methods can in principle provide the enrichment capability not as readily available for uranium. The hazards of handling the highly toxic plutonium are perhaps forbidding to most of us, but perhaps not to the desperate or fanatic with whom we are concerned. Using simple methods for fast reactor criticality calculations as, for example in *Nuclear Reactor Engineering* by Glasstone and Sesonske, one can calculate what mass of plutonium oxide would be certain to have explosive properties. An examination of the fast neutron cross sections for the appropriate energies will quickly show that plutonium is at least 50% more reactive than ^{235}U. Thus it is evident that the reactivity for a plutonium device will be greater than for a uranium one under similar conditions. Commercial grade plutonium will have a large fraction of its

content as ^{240}Pu with its high spontaneous fission rate. This constitutes a large neutron presence of more than 10^6 neutrons per second and complicates the design. Rapid assembly methods can be imagined which will to some extent overcome this difficulty and result in an explosive yield. In general, it can be stated that the high ^{240}Pu content will make the explosive performance quite unpredictable but not impossible. The degree of sophistication required for a successful device with this material is greater than the types previously discussed. One should not assume however that such sophistication does not exist in the criminal or fanatic world.

As a summary, I have tried to be more convincing in the statement that almost all forms of fully enriched uranium -- greater than 90% -- constitutes a real -- not an imagined -- hazard as an explosive device. This statement includes oxides of uranium, in contrast to earlier remarks. The same statement can be made for plutonium, including commercial grades, with the added concern that its enrichment is obtained by chemical separative techniques fully described by the Atomic Energy Commission in its handbooks.

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

----------X

THE STATE OF NEW YORK,

Plaintiff,

-against-

THE NUCLEAR REGULATORY COMMISSION, et al.,

Defendants.

AFFIDAVIT IN SUPPORT OF TEMPORARY RESTRAINING ORDER AND PRELIMINARY INJUNCTION

75 Civ. 2121 (WCC)

----------X

STATE OF NEW YORK)
: SS.:
COUNTY OF NEW YORK)

JOHN F. SHEA, III, being duly sworn, deposes and says:

1. I am an Assistant Attorney General in the Environmental Protection Bureau of the New York State Department of Law and am assigned to the above-entitled action. I make this affidavit in support of a renewed motion for a temporary restraining order and in further support of the motion for a preliminary injunction.

2. Upon information and belief Transnuclear, Inc., has applied to the Nuclear Regulatory Commission ("NRC") for two import licenses, each of which would cover a "shipment" of uranium hexafluoride from France. I understand that it had been contemplated that both of these "shipments" would be transported

on one flight into J.F.K. Airport. I learned yesterday from Transnuclear, Inc., that the licenses originally were expected to be approved by the NRC this week and that these "shipments" originally were expected to be transported in early August. Transnuclear, Inc., then also informed me that it had learned subsequently that the NRC licenses would not be forthcoming this week. Upon information and belief, one "shipment" would consist of 150.453 kilograms of 79.7% U-235 enriched uranium hexafluoride and the other "shipment" would consist of 8.86 kilograms of 77.3% U-235 enriched uranium hexafluoride.

3. On May 7, 1975, the Court in part based its denial of plaintiff's motion for a temporary restraining order on the fact that it was not satisfied that there was a threatened air shipment of special nuclear materials. Transcript May 7, 1975, p. 23. Since such shipments are now threatened, plaintiff renews its motion for a temporary restraining order. As indicated by the papers previously submitted by the plaintiff and the affidavit of Peter N. Skinner, sworn to today and submitted herewith, 1) defendants have adduced no arguments to dispute that their admitted failure to file an Environmental Impact Statement is a violation of a clear, non-discretionary legal duty under the National Environmental Policy Act of 1969 and 2) the continued air transport of special nuclear materials constitutes possible irreparable injury so as to require a temporary restraining order. Paragraph 13 of the verified complaint states that

"special nuclear materials" by regulatory definition includes uranium enriched in the isotope 235. Paragraph 35 states that air shipment of special nuclear materials endangers lives in part because of the possibility of terrorist activity directed toward such materials in the course of transport resulting in the manufacture of nuclear weapons. Paragraph 36 states that U-235 is suitable for manufacture into nuclear weapons. Paragraphs 37-40 of the verified complaint with attached exhibits and the affidavit of Theodore Mason and Robert R. Leamer detail terrorist risks involved in the air transport of special materials. Finally, the affidavit of Peter N. Skinner, dated today, sets forth the deadly capability which would be placed in the hands of a terrorist obtaining the shipments of uranium hexafluoride referred to in the above-mentioned license applications.

4. I respectfully request this affidavit and the affidavit of Peter N. Skinner, dated today, be sealed.

WHEREFORE, it is respectfully requested that the Court grant plaintiff's motion for an order temporarily restraining, annulling and setting aside, pending the determination of plaintiff's motion for a preliminary injunction, all present and future licenses, approvals and other actions of defendants, their agents, servants, employees, attorneys and all persons in

active concert and participation with them which, directly or indirectly, permit or execute the transport by air and related connecting transport of plutonium and other special nuclear materials to, from, in and over the City and State of New York and the United States and its territories and directing defendants to forthwith instruct nuclear materials shippers, air and other carriers, and other persons or entities procuring or executing such transport that such temporary restraining order is in effect.

JOHN F. SHEA, III

Sworn to before me this
31st day of July, 1975

Assistant Attorney General
of the State of New York

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

THE STATE OF NEW YORK,	:	
Plaintiffs,	:	AFFIDAVIT
-against-	:	75 Civ. 2121 (WCC)
THE NUCLEAR REGULATORY COMMISSION, et al.,	:	
Defendants.	:	

STATE OF NEW YORK)
: SS.:
COUNTY OF NEW YORK)

1. I am an Environmental Engineer in the Environmental Protection Bureau of the New York State Department of Law. I make this affidavit in support of a renewed motion for a temporary restraining order and in further support of the motion for a preliminary injunction.

2. There is a serious possibility that terrorists obtaining sufficient quantities of uranium hexafluoride could make a practical nuclear explosive. Theodore Taylor and Mason Willrich, who are referred to at paragraph 38 of the affidavit of Theodore Mason and Robert R. Leamer as highly qualified experts, have pointed out that uranium hexafluoride

is relatively easy to convert to uranium metal or oxide and such conversion could be carried out, conceivably in a clandestine laboratory, by using inexpensive chemicals and equipment that can be purchased commercially. Willrich & Taylor, Nuclear Theft: Risks and Safeguards 17-18 (1974). Thus, for example, 158 kilograms of 79% U-235 enriched uranium hexafluoride would yield approximately 107 kilograms of U-235 metal.

3. Taylor and Willrich have also pointed out that it is probable that a fission bomb with a yield of at least tens of tons of high explosive could be made with metallic uranium at any U-235 enrichment level above ten percent and that even a bomb with a one ton yield could cause terrible destruction. Id., pp. 16-17, 62-63. They point out that the amount of metallic uranium required to form a critical mass would vary depending upon the percentage of U-235 enrichment in the following manner, Id. p. 17,:

Enrichment	Amount Required
100%	15 kilograms
50%	50 kilograms
20%	250 kilograms
10%	1000 kilograms.

I have calculated that 107 kilograms of 79% U-235 enriched uranium metal would be sufficient for 4-5 fission bombs. See Figure 1 attached hereto. The uranium core of such a bomb would be only approximately 5 inches in diameter. See Figure 1 attached hereto.

4. Taylor and Willrich have indicated that a bomb-maker would find U-235 easier to handle safely than plutonium. Id., p. 16. Moreover, the design of a fission bomb using U-235 metal has been described in the New Yorker Magazine and elsewhere. See, John McPhee, The Curve of Binding Energy, The New Yorker, December 17, 1974, pp. 72-76.

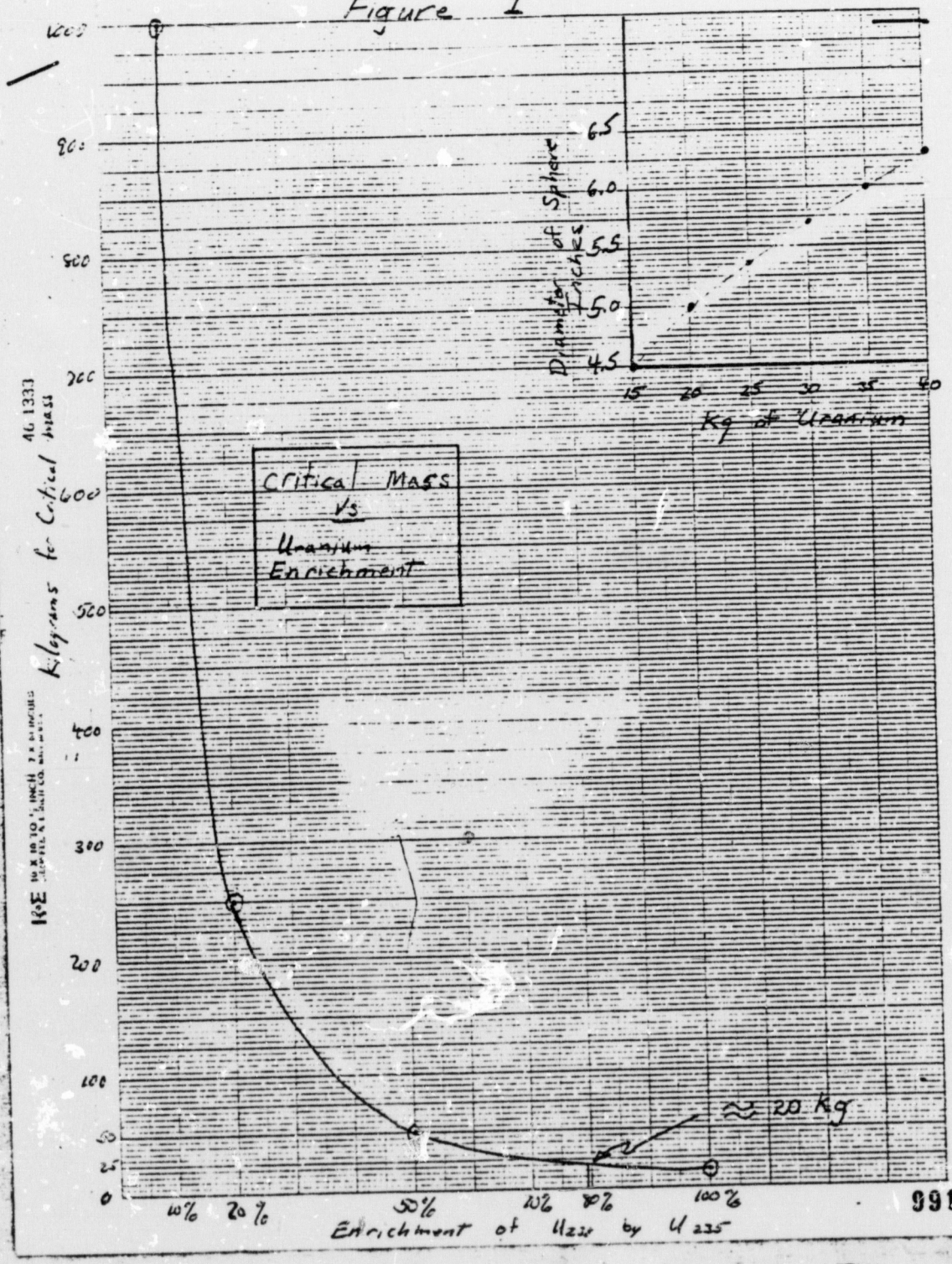
Peter N. Skinner

PETER N. SKINNER

Sworn to before me this
31st day of July, 1975

Assistant Attorney General
of the State of New York

Figure 1


Kilograms for Critical Mass
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UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF NEW YORK

STATE OF NEW YORK, Plaintiff,	
versus	75 Civil 2121
THE NUCLEAR REGULATORY COMMISSION et al., Defendants.	

New York, N. Y.

August 4, 1975 - 4:45 p.m.

Before

HON. CHARLES E. STEWART, JR.,

District Judge.

APPEARANCES:

LOUIS J. LEFKOWITZ, Esq.,
Attorney General of the State of New York
JOSEPH J. ZEDROSSER, Esq.,
Assistant Attorney General

PAUL J. CURRAN, Esq.,
United States Attorney for the Southern District of New York
CHARLES F. RICHTER, Esq., and
NATHANIEL L. GERBER, Esq.,
Assistant United States Attorneys

- - -

MR. ZEDROSSER: Your Honor, the State of New York is the moving party here for the temporary restraining order. My name is Joseph J. Zedrosser, from the Attorney General's office.

I would like to give a brief background, if I may do so --

THE COURT: I had a few minutes at lunchtime to take a quick look at the papers. I gather the immediate problem is the TRO. I understand that Judge Conner denied an application for a TRO back in May, because he wasn't persuaded that there was any need for it at that time, and you went back to him on Thursday, and I am not clear what he did on Thursday or why he did what he did.

MR. ZEDROSSER: Does the Court have a copy of Thursday's transcript? It is a very short one. If not, I will be happy to hand up mine.

What happened on Thursday is that the Court indicated that it appeared from the affidavits submitted that there will be a shipment and that it would entail at least some danger of hijacking by terrorists and that there would be some danger that if terrorists with the right know-how obtained the materials, they could fashion a fission bomb from the materials.

Incidentally, it's because of the topic involved

here that we wanted to do this under circumstances where it would not be in public, and it has worked out that way, anyway.

THE COURT: Yes. Do you want the transcript sealed?

MR. ZEDROSSER: Yes. That would be fine, your Honor.

THE COURT: All right. We will have the transcript sealed, and the reporter is so directed.

MR. ZEDROSSER: Judge Conner, notwithstanding what I have just mentioned, indicated that it was up to the representatives of the United States agency being sued here to try to find out whether indeed the shipments involved were urgent, because the assistant U. S. Attorney at that time had not had the time to really find that out, and, number two, whether any military surface transport opportunities were available which could serve as an alternative for the shipment.

Judge Conner did not refuse to grant the injunction. He deferred action on it in order to give the U. S. Attorney's office the time to respond on those two issues, and since he is on vacation, and your Honor is the Part I Judge, he suggested that we go before you today.

The background, of course, is that we filed a complaint back on May 5th alleging that the defendants had

had violated NEPA, the National Environmental Policy Act by their actions in variously executing or allowing the transport of special nuclear materials by air, and we ask in the complaint for a permanent injunction.

At that time, we also asked for a temporary restraining order and a preliminary injunction. As the Court noted, the TRO was denied at that time in part because the Court wasn't satisfied that any shipments were forthcoming. The preliminary injunction motion has not yet been decided.

Basically, NEPA requires that an environmental impact statement be filed prior to any major Federal action significantly affecting the environment. As a practical matter here, based on the briefing that was done on the preliminary injunction motion, it is in effect conceded that NEPA is applicable, and it was of course also conceded that no such impact statement was ever filed.

As a practical matter, our success on the merits here is not merely probable but assured -- the ultimate success on the merits.

THE COURT: Say that again.

MR. ZEDROSSER: The ultimate success on the merits here on the claim under the National Environmental Policy Act is assured, because it is not really contested that, number one, no statement was filed and, number two, a state-

ment should have been filed. ~~The only~~ there is no issue is whether a statement was filed.

THE COURT: If that is so, I would let the defendants go ahead a file a statement, wouldn't you?

MR. ZEDROSSER: Well, they say it takes some time to do that, your Honor. As of about a month or two ago, they said it would take a year to file a draft statement -- six months to file a draft statement and a year from now to file a final statement.

THE COURT: What is going to happen in the next few days that you think requires a TRO?

MR. ZEDROSSER: Well, as indicated in the affidavit of Mr. John Shea, we learned last week that Transnuclear, Inc., a shipper, had applied for two licenses from the Nuclear Regulatory Commission to import quantities of uranium hexofluoride, which is a special nuclear material, from France, we understood. We found out that originally it had been thought that the licenses would be granted last week and that the shipments would come in by air on one flight to Kennedy Airport.

THE COURT: Where do they go from Kennedy?

MR. ZEDROSSER: Well, we have since learned that these particular shipments are supposed to go to, I believe it's Portsmouth, Ohio, if I have it correct. In any event,

we were also informed by Transnuclear that apparently the licenses had not yet been granted and that it was not clear exactly when the shipments were going to come in.

The point here, however, is that our suit is to enjoin the Federal actions, among them licensing actions. Number two, we have no idea exactly what time the licenses would be granted.

THE COURT: You want to enjoin any licenses until NEPA has done what it is supposed to do?

MR. ZEDROSSER: Until it's been complied with. That's right.

Of course, on the TRO all we are asking is that there be an injunction of all licenses and other actions until the preliminary injunction motion is decided.

THE COURT: Well, I don't know what this material is going to be used for and who is going to use it. I would suppose that the same problem that you and your client are raising could be raised by any state or municipality in this country, so if you are right, we just can't bring it in; is that right?

MR. ZEDROSSER: By air. Our suit relates to shipments by air, and that's critical here. We are not saying that these materials can't be transported. We maintain there are adequate other means for transporting them.

THE COURT: The only other means to bring it from France would be by boat.

MR. ZEDROSSER: That is correct.

THE COURT: Why? Is that less dangerous? How could you bring it in by boat? Can you bring things in by boat without getting the environmental impact statement that you say is required?

MR. ZEDROSSER: I think that NEPA applies whether it goes by ship or by plane. I think the Court's implication is correct.

THE COURT: By ship there still must be compliance with NEPA?

MR. ZEDROSSA: Our problem here, your Honor, is that the way they are in fact being transported now, which is by commercial air carrier through places like Kennedy Airport, not really the point that it is going any place here on the East Coast, but going to Ohio some place, has some specific problems, which are set forth in detail in the affidavits of Mason and ~~Lima~~ Leamer.

The simple fact is, to over-simplify it a bit, these things are being shipped around like sacks of potatos. We are suggesting that where there is a danger of terrorism, as there is with this kind of material, that it ought to be shipped by military transport, and the Mason-~~Lima~~ Leamer affidavit

points out that the capability to so ship it would exist.

As for the particular use of these shipments, Mr. Richter --

THE COURT: The affidavits point out what capability there is to do it by ship; is that correct?

MR. ZEDROSSER: Yes. Military surface ship transport.

Now, as far as the use of this particular --

THE COURT: But if this can't be done without an environmental impact statement by NEPA, what difference does it make how it is done? I don't understand your position. You say, bringing it in by ship is okay.

MR. ZEDROSSER: All we are saying is that we are trying on the TRO here to avoid irreparable harm. We are trying to avoid the problem of a terrorist diversion and subsequent use of the material.

THE COURT: Well, you are afraid that something very destructive might happen in a week or two weeks or three weeks, and you want to avoid that, pending the opportunity to get closer to the injunction?

MR. ZEDROSSER: That's part of it.

THE COURT: Do I understand when you said a few moments ago that there is nothing going to cime in --

MR. ZEDROSSER: That is not for me to say. That is

better addressed to the Government.

THE COURT: You said something was coming in, but you weren't sure.

MR. ZEDROSSER: That's right. According to the shipper, the licenses for these particular imports were to have been granted last week, and the shipment was to arrive in early August. All that we have learned so far from them is that the license wasn't granted last week. As far as I know, it hasn't yet been granted, but it's a Sword of Damocles hanging over us, and it could come down at any time.

THE COURT: All right. Let me hear from the Government.

MR. RICHTER: Thank you, your Honor.

The first thing that I should point out, your Honor, is that this,, as Mr. Zedrosser said, is a case in which the State of New York is seeking to enjoin or have enjoined the air transportation of uranium and plutonium pending completion of a NEPA statement by the Government.

Before the action was even commenced, the Government had agreed to the preparation of a NEPA statement, and because of the length of time involved and the number of tests that have to be made, as Mr. Zedrosser said, the draft will be completed within six months, and the final statement within one year.

We should stress at the very beginning that enriched uranium, which is the subject of today's TRO application, has been transported by civilian aircraft for twenty-five years without a plane crash and release of the material or hijacking of any nature. This action was commenced three months ago. The precise relief that Mr. Zedrosser is looking for today was requested at that time, when the State also asked for a TRO, and at that time Judge Conner denied the application for the TRO. We see no reason why it should not be denied today.

We also point out that the State has asked Judge Conner to re-assign this case to another Judge, and I take it from Mr. Zedrosser's oral argument that what he is looking for is a temporary restraining order covering all air transportation of uranium. That, in effect, your Honor, would be a decision of this case, and in effect that would be the granting of the State's request to have this case assigned to another Judge, which Judge Conner refused to do, and we forewarned the Court that the State might use this TRO as an attempt to get this case before a different Court.

We would also point out that before this issue could be decided, one would have to read all of the papers in this case.

THE COURT: Well, I don't understand that the grant-

ing of a TRO here would lead to a re-assignment of the case. What is your point?

MR. RICHTER: My point is, your Honor, that if a TRO were granted covering all air transportation of uranium in or over the United States, as the State appears to be asking here today, that in effect would be a decision on the merits of the case, and that decision could not be made, we would submit, until the papers were read.

THE COURT: I don't think that would be a decision on the merits, but anyway --

MR. RICHTER: The point is, your Honor, the point that I would like to emphasize is that all the State is seeking is a TRO with respect to this particular shipment of uranium. As to this shipment of uranium, what is involved is approximately 159 kilograms of enriched uranium, which are being imported into the United States. It is being imported pursuant to a foreign treaty between the United States and a collection of European countries. The purpose is to bring the uranium into the United States to go to the former AEC plant at Portsmouth, Ohio, where it will be re-enriched and then exported back to Europe, where it will be fabricated and used as fuel in several European countries.

THE COURT: Who is dealing with it in Ohio?

MR. RICHTER: The Energy Research and Development

Administration has a plant there. It's the former AEC plant.

THE COURT: They are going to do certain things to it, and it is going to go back to France?

MR. RICHTER: That's right. It will be processed, and it will go back to Germany, where it will be used as fuel in nuclear reactors for research. It will be used, I am informed, in many countries in Europe as a reactor fuel.

THE COURT: When is it coming?

MR. RICHTER: Well, that's not certain at all. Before any material can be imported into the United States by a non-Government agency, it is necessary to have a license from the Nuclear Regulatory Commission, another successor agency to the Atomic Energy Commission.

Transnuclear, which is the importer and shipper in this case, has requested such a license. The decision to grant such a license is up to the Commissioners of the Nuclear Regulatory Commission, and the license it grants will not specify the mode of transportation. In this particular regard, it will be left up to the shipper, because it is the position of the Nuclear Regulatory Commission that all modes of transportation, whether sea or air or domestically by truck or train are equally safe.

We do not know at this time when the licenses will

be acted upon. The information I have is that at the earliest it will be acted upon by this Thursday or the latter part of this week. It may not be acted upon until next week. If, for example, it were not acted upon until the latter part of the work, the shipment could not come in until after Judge Conner has returned, and in such a situation it would be unnecessary for the Court to resolve this TRO. We will not know for certain or will not have a better idea as to when the license application will be decided until tomorrow or the next day. However, we do know that it will not be decided without your Honor knowing.

THE COURT: How long after it is acted on as approved can the shipment take place in due course?

MR. RICHTER: Well, that would be up to the shipper.

THE COURT: Could it be within twenty-four hours?

MR. RICHTER: If it were an air shipment, yes, it could be within a twenty-four-hour period, and that is another point which is important as to the merits.

THE COURT: You say it would be by commercial aircraft?

MR. RICHTER: Yes; it would be, your Honor.

THE COURT: And would that be a cargo plane?

MR. RICHTER. Yes. It would come in on an all-

cargo plane. It will not come in on passenger aircraft.

THE COURT: Why not bring it in by ship?

MR. RICHTER: Well, what difference would it make whether it came in by ship or by plane. The key point and the only point in this application for a TRO is that the State claims it should come in by ship because there are security problems in transporting it by air.

I want to stress at the outset that there are no safety problems in transporting it by air. The State has conceded that even if there were an air crash, there is no danger from the transportation.

THE COURT: The security problem is that it might be hijacked?

MR. RICHTER: That's correct, your Honor, and now the other thing I want to stress is that the whole point of the State's suit is to ban the transportation of uranium by air in or over the United States, and I do not see what difference it makes --

THE COURT: I don't know why the State has to be concerned about the other forty-nine states. I am concerned about the other forty-nine states, and I think it is fine that the State of New York is, but I don't think they have any legal reason to be concerned about the other states.

MR. RICHTER: This shipment will not be flown into

Kennedy. The shipment will be flown to the Midwest. The plane will probably refuel -- I am told it would refuel if it goes by air in Montreal. I cannot represent to this Court that it would not fly over the State of New York. I don't know how planes fly into the country. But this plane will not stop at Kennedy, will not stop at any New York airport.

THE COURT: Well, now, an environmental impact statement: it might have some impact upon me, that problem, but in a somewhat different -- not a terribly different context, involving the City of New York and air pollution as the result of emission in the air of lead from gasoline which does not comply with Federal requirements.

If it is clear that an environmental impact statement should be issued, to be issued or not issued depending on whatever the Government does -- well, I guess I have answered my own question. We don't know what the Government is going to do, so it's not improper to proceed as you propose to proceed.

MR. RICHTER: I should also point out, your Honor, again, that the whole crux of this TRO and the burden on the plaintiff is that there is some security problem in bringing this material in by air. The burden is on the plaintiff to show that it would be harmed by bringing this

material in by air. There is absolutely no guarantee that this material is going to be hijacked. The burden is on the plaintiff to show that there is a substantial probability of irreparable harm to get a TRO.

When Mr. Zedrosser and Mr. Gerber were before Judge Conner, when this matter was argued -- I at that time was not there; we had no prior notice of the conference, except that the Judge's law clerk called us ten minutes before it was to occur. Judge Conner said, "I am not disposed to sign the order unless I know what alternative methods of shipment are available and I am satisfied that the alternative methods of shipping pose a significantly lesser hazard," and now I submit, your Honor, there is none --

THE COURT: All right. I think I have heard all I need to hear. I haven't heard enough to grant a TRO, but I am going to require the Government to do this: to notify me immediately when a license is granted, and I want the Government to undertake to insure that no shipments are made sooner than forty-eight hours after I am notified of the granting of a license and you are notified, Mr. Zedrosser, so that we can sit down again and consider the problem in the light of the situation at that time.

MR. ZEDROSSER: Your Honor, the suit is precisely about the granting of licenses, not merely the shipments.

THE COURT: Yes. Well, I don't see how -- You don't care if a license is granted and no shipments are made; isn't that right?

MR. ZEDROSSER: We do care. We [redacted] want the defendants here, who are the Federal regulatory agencies here, to have a license requiring them to go by other modes. That's what the whole suit is about.

THE COURT: Well, if that is what the whole suit is about, Mr. Zedrosser, I am not going to give you the temporary relief which you are requesting at this point. The most I can do at this point, as I have indicated, is that I will require that the Government give me forty-eight hours' notice, in effect, and give you forty-eight hours' notice, and if the situation has changed in any way at all, you will have an opportunity to let me know, and if it is important that we do something, we will consider doing it, but I can't see at this point, Mr. Zedrosser, that there is enough here to justify my granting you a TRO which would prevent the issuance of licenses. Unless you have something much more affirmative than I've got at the moment, I doubt that I would be inclined to do so.

I share the concern of the State of New York, and I think it is a concern we all share. We don't want people running around with material that might be used to fashion

nuclear weapons. On the other hand the use of nuclear materials is something which our society is very much interested in, particularly with the energy shortages that we all know about.

I don't see how we can avoid recognizing the fact that no matter what material you use to create energy, there is a hazard involved, that it can be used as an explosive and in a very dangerous way. This applies to all energy materials that I know about.

All right.

MR. ZEDROSSA: Your Honor, since the Court has not really had a chance to look at the transcript in detail of the hearing --

THE COURT: No; I haven't, but I have turned the pages very quickly, and I think I've gotten the feel of what Judge Conner's thinking was, and, indeed, I spoke to him before he went on vacation.

MR. ZEDROSSER: I might point out, on page 6 he said, "If there were a surface vessel coming this week which could be used as an alternative mode of transport, unless there is a critical loss of time, I might be inclined to grant the order."

THE COURT: All right. Let's find out when a license is granted. If I hear something from Judge Conner

that there would be more security if you bring it in my way of ship -- however, the forty-eight-hour delay which I have required will give us a chance to look at the possibility of transport by some other means -- and I don't mean to suggest for a moment, Mr. Zedrosser, that I can't be flexible about those forty-eight hours if it is clear that you need more time.

MR. ZEDROSSER: Your Honor, what I fear more, frankly, is that we are going to bootstrap ourselves into a critical situation. Our reason for coming to the Court as early as we could was to allow for alternative modes of shipment. What we are going to have here is a self-fulfilling prophesy.

THE COURT: No; I don't think that's necessarily so, Mr. Zedrosser. First of all, I am not convinced that shipment by ship is a safer and more secure mode of transport at this time. On the other hand, if shipment by ship is available and it appears clear to me that that is, for some reason which I don't see at the moment, safer and more secure, obviously we will consider it.

I don't see that any of us are going to get bootstrapped into any kind of a situation. I have given the Government a requirement that they let me know when the license is issued and requiring that they do nothing for

for forty-eight hours after.

What happens in the period following those forty-eight hours is wide open.

MR. ZEDROZZER: What we are asking for, your Honor, is military transport. I think if the Court is wondering what is so wonderful about surface transport as opposed to air, we emphasize that this ought to go by military transport.

THE COURT: What difference does it make whether it is military or civil, if it is going to Montreal and then to Ohio?

MR. ZEDROSSER: First, the flying over the state, and, two, our suit was brought for the entire United States.

Frankly, if there is a diversion, and a bomb is blown somewhere in this country, I don't think the radioactive particles are going to respect state lines.

THE COURT: Is your action a class action?

MR. ZEDROSSER: No, but I believe we have standing under NEPA to raise this issue for the entire United States.

THE COURT: Well, perhaps you do. I don't know about that aspect of the question. I haven't had a chance to look into it. I just don't know what the law is until I look into it.

MR. ZEDROSSER: We are, incidentally, asking here

for a TRO relating to all licenses and approvals, not merely these particular ones. It was the absence of a particular --

THE COURT: The one at the moment, I gather, that you are concerned about is the one that I have seen these papers on today.

MR. ZEDROSSER: Your Honor, I must say it is the only one we know about.

THE COURT: This one has the affidavit of Mr. Mason and Mr. ~~Lima~~ Leamer.

Well, that is my view at the moment, Mr. Zedrosser, I want to assure you that I don't consider this an easy matter. It's one that I think ought to and, I am sure, does concern all of us. It does seem to me at the moment I don't have sufficient to justify a TRO. I am fully prepared to take an immediate look at the problem when it comes closer to reality, when it does.

All right, gentlemen.

MR. ZEDROSSER: Thank you, your Honor.

MR. RICHTER: Thank you.

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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

THE STATE OF NEW YORK,

Plaintiff,

-v-

THE NUCLEAR REGULATORY COMMISSION, et al.,

Defendants.

AFFIDAVIT

75 Civ. 2121 (WCC)

LEO MACKLIN, being duly sworn, hereby deposes and says:

1. I am president of Transnuclear, Inc. ("Transnuclear") and I submit this affidavit in opposition to plaintiff's motion of July 31, 1975, for a temporary restraining order.

2. Transnuclear has applied for a license from the United States Nuclear Regulatory Commission to import 150.453 kilograms of 79.7% enriched uranium hexaflouride and 8.86 kilograms of 77.3% enriched uranium hexaflouride into the United States. The license was granted on August 18, 1975.

3. The uranium is being imported pursuant to an international agreement of cooperation between the United States of America and Euratom, an official common market organization. It is to be transported to the United States Energy Research and Development Administration's gaseous diffusion plant at Portsmouth, Ohio, where it will be further enriched to have a higher concentration of the isotope 235.

4. The higher enriched uranium, or other identical material already in stock at Portsmouth, will be returned to France and Germany where it will be further processed so that it may

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be used as a nuclear reactor fuel. It will then be sent to research facilities in Europe, particularly in France, to be used to fuel nuclear research reactors. A small portion will go to Canada for the same purpose.

5. It is important that this material be returned to Europe as quickly as possible to avoid the possible shutdown of these nuclear research reactors for lack of fuel.

6. Transnuclear is in the process of arranging for the uranium to be flown in a commercial all-cargo aircraft to Chicago, with a stopover for refueling in Montreal. Upon information and belief, the aircraft will not fly over New York State.

7. The flight will take approximately ~~eight~~ ten hours. Due to the scheduling of all-cargo flights from France to Chicago, the earliest the uranium can arrive in Chicago is Tuesday, August 26, 1975.

8. Upon arrival in Chicago, the aircraft will be met by armed guards and a truck which will immediately transport it to Portsmouth, Ohio.

9. Transportation of the uranium by ship to the east coast and then by truck to Ohio would mean a delay of nine days at a minimum and 18 days for the round trip. The voyage itself takes eight and one-half to nine days. It also takes time to find a ship which can carry the material to an appropriate port in the United States since there are far fewer such ships than cargo flights. Further delay would be caused at the pier because it takes longer to load a cargo ship than a cargo plane. In addition the uranium would have to be transported a longer distance in France to reach the ship than if it went to the airport.

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10. From a security standpoint, the use of air transportation greatly reduces the risk of theft or diversion of this uranium in two ways. First, the longer the uranium is in transit, the longer it is exposed to such risks, and air transportaion greatly shortens the time it is in transit. Second, air transportation reduces the risk of hijacking since the only potential source of hijacking while it is on the aircraft is from persons within the aircraft, while uranium being transported by surface means is open to hijacking from external sources.

11. Thus if the temporary restraining order were granted, the uranium would be exposed to security risks for at least nine more days than if it went by air and it would be subject to a greater risk of hijacking since it could only go by surface means of transportation.

12. It is therefore my opinion that the use of air transportation to ship this uranium is not only necessary because the material is needed as quickly as possibly to fuel research reactors in Europe, but also because it is a more secure means of transportation.

Leo Macklin

LEO MACKLIN

Sworn to before me this
2nd day of ~~August~~ September, 1975

Patricia R Leydon

PATRICIA R. LEYDON
Notary Public, State of New York
No. 03-2636195
Qualified in Bronx County
Commission Expires March 30, 1977

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